FUNDAMENTALS OF COMPUTER

New Revised Edition

Study Book for Computer Science

According to the syllabus of
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Sheikh Faisal Manzoor

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FUNDAMENTALS OF COMPUTER

For ICS 1st year & BSc(Computer Studies 3rd year)

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Acknowledgements:

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2. Mr. Shahid Barket, Lecturer in Computer Science Islamia Boys College Quetta.

3. Mr. Muneeb Ahmed, Lecturer in Computer Science FG Degree College Lahore Cantt.

4. Muhammad Waqas, Lecturer in Computer Science Govt Boys Degree College Zhob.

5. Mr Nawab Din, Lecturer in Computer Science Govt Boys Degree College Turbat.

6. Mr. Baqir Raza Khan, Lecturer in Computer Science General Musa Govt Degree College Quetta.

7. Mr. Zeeshan, Lecturer in Computer Science Tameer-e-Nau College Quetta.

8. Mr. Rashid Ahmed, Lecturer in Computer Science Govt Girls Degree College Quwary road Quetta.

Published by: Sheikh Faisal Manzoor

Edition: Revised 5th Edition 2017

PREFACE

Computer knowledge like all scientific knowledge has maintained its importance in this modern age because of its utility in every day dealings. This branch of knowledge has shown its impact on almost all modern fields of research.

I thank Almighty God, who has given me ability to frame this study guide to help the student of XI year studying Computer Science. It is in accordance with the latest syllabus of B.B.I.S.E Quetta. It also covers 80% course of BSC 3rd year (Introduction to IT).

I have framed this book with sheer sincerity and utmost effort to help the students in achieving their objectives. I have tried to put the matter in an easy language. An important feature of this Study Guide is that it covers every topic including Basic knowledge of IT, Computer Networks, Data Communication, Uses of Computer, Computer Architecture, Word Processing Application, Spreadsheets etc. Syllabus and important abbreviations have been given for further guidance. Following sources and books are consulted for the preparation and compilation of this guide.

> ➢ Introduction to Computers by Peter Norton
> ➢ Computer Fundamentals by PK Sinha
> ➢ MCSE Networking Essentials
> ➢ Internet

I do hope this study guide will equip the students with a wide range of computer knowledge and win favour and admiration from the students. Any suggestion for its further improvement is however invited.

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INDEX

CHAPTER 1
BASIC CONCEPT OF
INFORMATION TECHNOLOGY

COMPUTER

Computer is an electronic device which takes input, process it and gives the output according to the given input. **OR**

Computer is an electronic device that converts the data into information.

DATA

Raw facts and figures are known as data. e.g. Ali, 10 etc

INFORMATION

Processed data is known as information e.g. Ali is a student of class 10th.

ADVANTAGES OF COMPUTER

1- Storage

We can store huge amount of data in storage medium of computer i.e Hard disk, Compact disc etc which can be used and modified in future.

2- Speed

Computer is a fast computing device, it can perform various operations with in a second, which a human being do in many hours.

3- Accuracy

The accuracy of computer is consistently high and the degree of accuracy of a particular computer depends upon its design. Errors can be occurred but they are mainly due to human rather than technological weakness, for example if the input data is incorrect, the resulting output will also be incorrect. In computer terminology it is known as Garbage In Garbage Out (GIGO).

4- Versatility

Versatility is one of the most important features of computer. Modern computer can perform different tasks one by one or simultaneously. One moment it is preparing

results of a particular examination the next moment it might be busy preparing fee particulars of a student.

5- Power of Remembering

Every piece of information can be stored as long as desired and can be recalled when required. Even after several years, the information recalled would be as accurate as on a day when it was fed to the computer. A computer forget or losses certain information only when it is asked to do so. So it is entirely up to the user to make the computer to forget particular information.

DISADVANTAGES OF COMPUTER

1- Dependent upon Human

Computer always depend on human being and do not take decisions by itself.

2- Health Problem

Continuous use of computer creates a problem of eye weaknesses, headache etc.

3- Unemployment

Computer has increased the ratio of unemployment, because one computer operator can do the work of several persons and organizations need not to appoint various employees to keep record of the organization.

4- Computer Crimes

Now a days computer is being used in hacking, blackmailing, threatening and in other such crimes.

GENERATIONS OF COMPUTER

The development of electronic computers can be divided into five generations depending upon the technologies used. Each generation is characterized by a major technological development that fundamentally changed the way computers operate,

resulting in increasingly smaller, cheaper, powerful, more efficient and reliable computers.

1- FIRST GENERATION (1942-1959 Vacuum Tube)

First generation computers used vacuum tube technology. These Vacuum tubes were like electric bulbs that produced lot of heat therefore extra cooling equipments were needed for these generation computers. ENIAC (Electronic Numerical Integrator And Calculator was one of the computers of this generation. The disadvantages of first generation computer were that they were very big in size, slow in speed, large power consumption was required and difficult in maintenance.
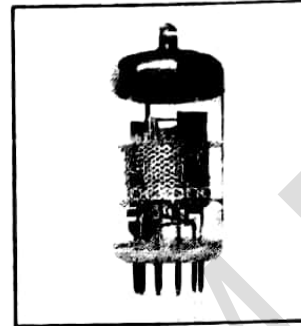
2- SECOND GENERATION (1959-1965 Transistor)

In second generation transistors replaced vacuum tubes. The transistors were far superior to vacuum tubes allowing computers to become smaller, faster, cheaper and more energy-efficient than first-generation computers. Though the transistors still generated heat but it was a vast improvement over vacuum tubes. A number of hardware improvements were made in this generation computers such as magnetic tape, magnetic disks, printers etc. IBM 1620 was one of the computers of this generation.
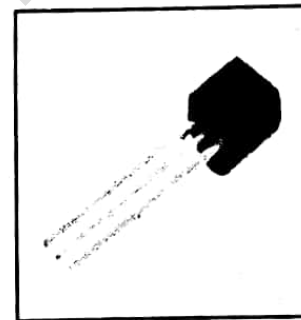
3- THIRD GENERATION (1965-1973 Integrated Circuits)

In third generation computers Integrated Circuits (ICs) began to be used. ICs were also called as chip. The invention of the IC was the greatest achievement done in the period of third generation of computers. These IC chips were compact than transistors. A single IC chip contains transistors, diodes, and resistances interconnected with each other. Computers of this
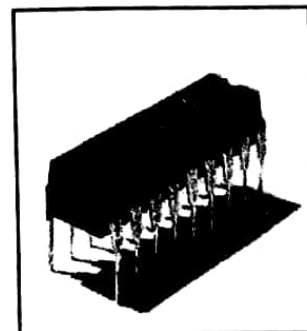
generation became smaller than the previous generations. IBM system/360 was one of the computers of this generation.

4- FOURTH GENERATION (Since 1972 Microprocessor)

After 1971 the fourth generation computers were built. The fourth generation computers were the extension of third generation technology. The fourth generation computers emerged with development of the VLSI (Very Large Scale Integration). With the help of VLSI technology microprocessor came into existence. The computers were designed by using microprocessor, as thousands of integrated circuits were built onto a single silicon chip. The first generation computers filled an entire room could now in this generation fit in the palm of the hand. The fourth generation computers became more powerful, compact, reliable and affordable. As a result, they give rise to personal computer (PC) revolution. For the first time in 1981 IBM introduced its computer for the home user and in 1984 Apple introduced the Macintosh Microprocessor.
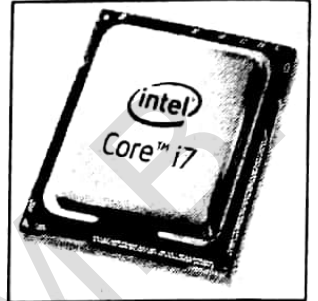
5- FIFTH GENERATION (Artificial Intelligence)

Fifth generation computers are in developmental stage which is based on the artificial intelligence. Lack of thinking power in computer is a challenge for the scientists. This generation computers are a step in this direction. The goal of the fifth generation is to develop the device which could respond to natural language input and are capable of learning and self-organization. So we can say that the fifth generation computers will have the power of human intelligence.

INFORMATION TECHNOLOGY

Information Technology refers to the use of hardware, software, and telecommunication networks to store, process, and communicate information with the help of modern technologies.

ROLE OF MICROPROCESSOR IN IT REVOLUTION / IMPACT OF COMPUTER IN OUR DAILY LIFE.

Earlier computers of 1940s and 1950s were based on vacuum tubes. Hundreds or thousands of vacuum tubes were used in a computer. The computers of that time were very large in size and emitted a very huge amount of heat from its vacuum tubes.

The invention of semiconductor transistors in 1959 reduced the size of a computer a little but still the computers were expensive, very much difficult to use and were not portable.

The invention of microchip/microprocessor has brought revolution in the field of information technology. A microprocessor is so small that it can be placed on thumbnail. It can control the entire computer system. Instructions are embedded on the microchip according to the needs.

Microprocessors are now so cheap and so small that they are now incorporated not just into computers, but also into wide range of other products like microwave oven, digital cameras, cars, washing machines etc. These appliances are able to control themselves, so that the minimum of human intervention is required. This has had an obvious impact on our lives as it has brought large improvements in efficiency and productivity as well as it has changed our daily lifestyle.

TYPES OF COMPUTER (according to work)

Computer can be categories into following three types:

1- Analog Computer   2- Digital Computer   3- Hybrid Computer

1- ANALOG COMPUTER

Analog computers are the special purpose computers that accept analog data (data in continuous or physical form), represent it in a suitable form on an indicator. Analog data include distance, speed, temperature etc. Analog computers are very fast in their processing but not very much accurate. Example of analog computers are speedometer of a car, thermometer etc.

2- DIGITAL COMPUTER

Digital computers are general-purpose computers and have different sizes and shapes. They accept data in the form of discrete numbers (0,1) and process it using various arithmetic and logic operations. Personal computers are the best example of that category.

3- HYBRID COMPUTER

Hybrid computer combines the features of digital and analog computers. They have the ability to process both the continuous and discrete data. These computers are generally used in military weapons i.e. used in Radars.

CLASSIFICATION OF COMPUTER (according to speed, storage and size)

Computers are classified into four types in terms of speed, storage and size.

1- Super Computer 2-Mainframe computer 3-Mini computer 4-Microcomputer

1- SUPER COMPUTER

Computers that are the fastest and most expensive computers of the running time can be called as super computers. They have extra ordinary amount of computing power required by large organizations i.e scientific laboratories, research laboratories etc CRAY-1, CRAY-2 and CYBER 205 are examples of Super computer.

2- MAINFRAME COMPUTER

These computers are large-scale computers together with their supporting equipments with a very high cot. Computer systems of this size can accommodate a large room. Mainframes are usually used in networking environment where dump or intelligent terminals (computers) are attached with mainframes.

- **Dump Terminal:** Dump terminal is a computer that has no storage and processing capabilities.
- **Intelligent Terminal:** Intelligent terminal is a computer that has a processing capabilities as well as storage capabilities.

3- MINI COMPUTER

These are the medium power computers, more than microcomputers but less than mainframe computers. Moreover they are low cost computers as compare to super and mainframes. These computers are usually used by private organizations that do not afford to buy super or mainframe computers.

4- MICRO COMPUTER

Micro computers are relatively inexpensive computers that are rapidly being used in all applications. Micro computers were introduces in 1970s as a result of the development of microprocessors. Microprocessors are inexpensive and very small in size and thus have reduced the size and weight computer system. Microcomputers are also known as Personal computers.

COMPUTER SYSTEM

Following are the essential parts of computer system

1- Data   2- Hardware   3-Software   4- People

DATA

Data are the raw facts and figures, which are given to the computer for some process to generate information.

TYPES OF DATA

1- Numeric data   2- Alphabetic data 3- Alpha numeric data.   4- Audio / Visual data   5- Physical data

1- Numeric data

It is a type of data that can be used in arithmetic operations like addition, subtraction, multiplication, division etc can be performed on that data. It is composed of digits from 0-9 have a positive or negative sign. It is further sub divided into two types

- **Integer:** A kind of numeric data that doesn't have decimal points. However it may have positive or negative nature. E.g. 21, -10 etc.

- **Float:** A type of numeric data having decimal points is known as floating point numbers. It may have positive or negative nature. E.g. 2.111, -61.90 etc.

2- Alphabetic data

It is a type of data, which cannot be mathematically manipulated. It is further sub divided into two parts

- **Character data:** A type of data having a unit length is known as character data. Character is usually enclosed in single inverted comas. E.g 'A', '9' etc.

- **String:** The type of data having variable length OR Collection of characters is known as String. It is usually enclosed in double inverted commas. E.g "FG College Quetta", "Govt Science College Quetta".

3- Alpha Numeric

It is a type of data, which combines both numeric, and alphabetic data. It cannot be used in mathematical operations. It can be composed of alphabets A-Z,0-9 and special symbols i.e *,/,& etc., e.g "H#11 Rahim Colony".

4- Audio / Visual

As the name implies audio/visual is a combination of audio data (having sound) and video data (having pictures).

5- Physical data

It is the type of data obtained directly from the atmosphere or environment i.e. temperature, wind etc. To measure that type of data special devices are needed like thermometer etc.

HARDWARE

The touchable parts of computer are known as hardware. These are usually attached with computer e.g. processor, keyboard, mouse etc. Hardware can be categories into following types on the basis of their nature.

1-Input Hardware

A type of hardware that is used to enter data into the computer. E.g. Mouse, scanner, keyboard etc.

2-Output Hardware

A type of hardware that is used to get information from the computer. Output hardware can be divided into two parts as follows:

- **Softcopy Output Hardware**

It is a type of hardware whose output is in non-tangible form i.e. its output can only be seen but cannot be touched e.g. Monitor.

- **Hardcopy Output Hardware**

It is a type of hardware whose output can be seen as well as touched and can be taken from one place to another. e.g. printer.

3- Storage Hardware

Storage hardware is used to store data / instructions either temporarily or permanently. Storage hardware can be classified into two groups as follows:

- **Primary (Temporary) Storage hardware / Short Term Memory**

This type of hardware is used to store data/instructions temporarily for a short period of time. Such storage devices are volatile i.e on power failure the stored content will be washed out. RAM is an example of such category.

- **Secondary (Permanent) Storage hardware / Long Term Memory**

It is used to store data/instructions for a long period of time. Secondary storage devices are non-volatile i.e. on power failure their contents are not affected e.g. Hard disk, floppy disk etc.

4- Communication Hardware

These types of hardware are used to transfer data between two computers or between two units of a computer.

- **Internal Communication Hardware**

It is the type of hardware that is used to transfer data from one unit to another unit of a computer. This communication hardware is composed of various parallel lines known as bus.

- **External Communication Hardware**

It is used to transfer data from one computer to another computer. It is usually physical lines connecting two computers. e.g Coaxial Cable etc.

5- Processing Hardware

It is the type of hardware used to process data according to the given instructions to generate output. e.g. microprocessor, math co-processor, I/O processor etc.

INPUT DEVICES

KEYBOARD

It is a device used to feed data to the computer. It is the most commonly used standard input device that consists of a number of keys. When a key is pressed special signals are generated by the keyboard and sent to the computer. The common keys on the keyboard are described below:

Alphabetic Keypad / Alphanumeric Keys: The alphabetic keypad situated in the middle of keyboard and covers most of the keyboard area. The keys in this area are labeled as A-Z,a-z etc.

Numeric Keypad: This keypad is located at the bottom right of the keyboard. The keys in this keypad are labeled as 0-9 and some arithmetic symbols. This keypad is usually used of numeric operations.

Function Keys: These keys are from F1 to F12, positioned above the character keys. The programmers assign special tasks to these keys.

The backspace key: used to delete the character to the immediate left of the cursor on the screen.

Arrow keys / Cursor Movement Keys: are used to move the cursor one-character position in the direction of the arrow.

Home key: is used to move the cursor to the beginning of the line.

End key: is used to move the cursor to the end of the line.

Esc Key: This key is used to quit from your currently selected option or task.

Enter Key This key is used to move the cursor to the beginning of the next line. It is normally used at the end of the paragraph.

PgUp and PgDn Keys: are normally used to move the cursor one page up or down.

Modifier Keys: The SHIFT, Alt(Alternate) and Ctrl(Control) keys are called modifier keys because they are used with combination of other keys.

Special purpose keys: i) Start key: opens the start menu. **ii) Shortcut key:** Opens an on-screen shortcut menu.

MOUSE

It is another commonly used input device after keyboard that is more efficient, speedy and flexible than keyboard. There are various types of mouse i.e Mechanical Mouse, Optical Mouse, and Laser mouse etc.

Mechanical mouse works with the help of small metallic ball, sensors and rollers. The sensors sense the movement of a ball and generates signal accordingly. A pointer is logically attached with a mouse, which expresses the position on the screen. A slight movement of the mouse results the change of position of mouse pointer on the screen. Mouse is also known as a pointing device.

A mouse can perform the following operation better than a keyboard.

i) Selection / Clicking / Picking: Selecting options from a list is known as Picking. A mouse can also be used to select an object that might be icon of file/folder. Usually the object is selected by clicking once on the object.

ii) Pointing: Moving rapidly from one point to another is known as Pointing.

iii) Execute/ Run /Double Clicking: Mouse is also used to execute programs stored in the computer. This task is carried out by double clicking.

iv) Dragging: Third main function of a mouse is to drag an object from source to destination. This function is used by copy a file / folder from one place to another, keeping the mouse button pressed and moving the object to the desired direction.

iv) Right Clicking: By Right clicking it opens a shortcut menu that contains options of the selected item.

v) Drawing: creating different shapes such as lines, circle, rectangle etc.

TRACKBALL

Track ball is similar to mouse. It works like an up-side-down mouse. We rest our thumb on the exposed ball and our fingers on the buttons. To move the pointer on the screen the ball is rolled with our thumb because we don't need to move the whole device. A trackball requires less space than mouse. When space is limited a track ball can be an advantage over mouse.
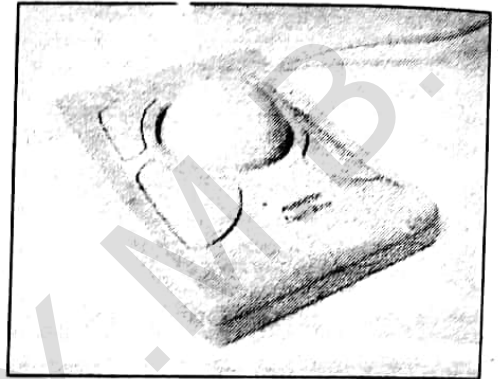
MICROPHONE

Microphones are becoming increasingly important as input devices to give audio data as input to computer. Spoken input is used in multimedia, phone calls, audio chat etc. Most PCs now have phone-dialing capabilities. So if we have our microphone we can use our PC to make the phone calls. Microphones also make the PC useful for audio conferencing over the Internet. For the input through microphone a **Sound Card** is also needed that translates the analog signal (sound waves) into digital codes the computer can store and process. This process is called digitizing. Sound Card also translates digital sound back into analog signal that can be sent to the speakers.
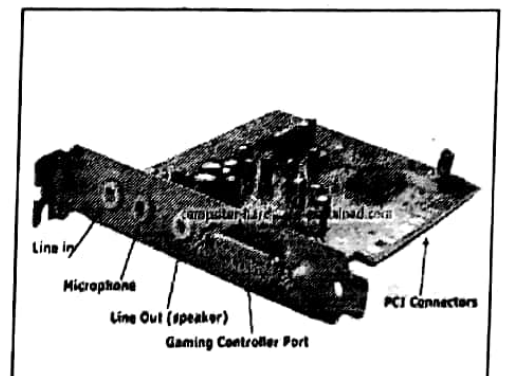
OPTICAL INPUT DEVICES

New technologies allow computers to use light as a source of input to the optical input devices. Some of the optical input devices are as follow:

1- BAR CODE READER

These devices convert a bar code, which is a pattern of printed bars on products, into a code the computer can understand. These codes represent the price, manufacturing date and other information about the product. The most common type of bar code reader is **flatbed** that is commonly found in super markets and departmental stores. Another type of bar code reader is **handheld** that is used by workers for delivery service such as FedEx (Federal Express), TCS etc to identify packages (prices) through bars.
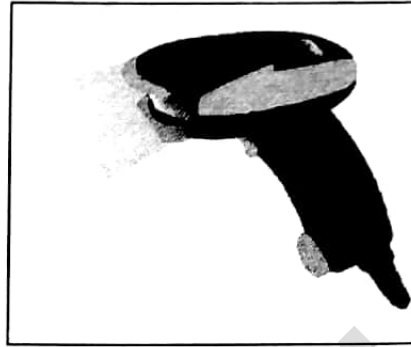
2- IMAGE SCANNER AND OPTICAL CHARACTER RECOGNITION

(OCR)   Image scanner is used to scan printed images, pictures, text etc. It converts any printed image into electronic form by shining light onto the image and sensing the intensity[1] of light reflection at every point. The image scanner is very useful because it translates printed images into electronic format that can be stored in to a computers memory for future use. If we want to scan a text document and wants to modify that text after scanning then the **Optical Character Recognition** is used to translate the image into text so that the modification in the text can be possible.

3- DIGITAL CAMERA

Digital cameras are similar to traditional cameras except that images are recorded digitally in the camera's memory rather than on film. The images can also be transferred to the computer for further use. Some digital cameras have the capability to record motion digitally and store them into the memory those can be called **Digital Video Cameras**. **Web Cams** are specialized digital video cameras attached

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[1] Strength

to the computer that capture images and send them to the computer for broadcast over the internet.

OUTPUT DEVICES

MONITOR

Monitor is a softcopy output device whose output can only be seen and cannot be touched. It is also known as a standard output device, which enables a user to see the information on the screen. The two commonly used monitors are as follows

1- Flat-Panel   2- CRT Monitors

1- Flat-Panel

The flat-screens / flat-panel monitors are slowly replacing the CRT Monitors. These were introduced for use on battery operated portable computers (Laptops). There are several types of flat-panel monitors but the most common is **Liquid Crystal Display (LCD).** The LCD monitors creates image with a special kind of liquid crystal rather than phosphor. The major advantage of flat-screen is that they are light in weight, consume less power, portable and provide the brightest and clearest picture. The disadvantage is that they are expensive and their viewing angle is limited i.e. in LCD monitors the view shrinks, as we increase our angle to the screen and image becomes fuzzy[2] quickly.

2- CRT (CATHODE RAY TUBE) MONITORS

These are typically used monitors in desktop computers, that look like a television screen and works in the same way. It consists of electronic gun, electronic beam and a phosphor-coated screen. A beam of electron (cathode ray) emitted by the electronic gun passes through focusing and deflection

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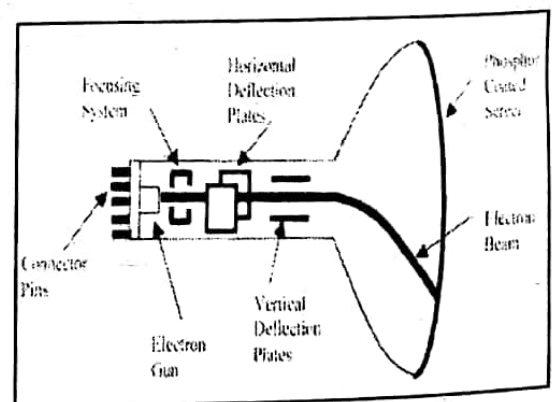
[2] Unclear

systems that direct the beam towards the phosphor coated screen at the back of monitor screen which then glow[3] when they are struck by the electronic beam. In color monitor there are three guns for each red, green, and blue (RGB colors) and each pixel contains three phosphors. The combination of these gives full color spectrum[4].

FACTORS INVOLVED IN MONITORS QUALITY

- **Resolution**

The number of pixels[5] on the screen shows the resolution of a computer monitor. 640 x 480 means that there are 640 pixels horizontally across the screen and 480 pixels vertically down the screen.

- **Dot Pitch**

The dot pitch is the distance between the phosphor dots that make a single pixel. In color monitor there are three dots red, green and blue in every pixel. If these dots are not close enough together, then the image on the screen will not be crisp.

- **Refresh Rate**

The refresh rate is the number of times per second that the electronic gun throws light / electrons to every pixel and redraws the picture repeatedly. The refresh rate is important because phosphor dots fade quickly after electronic gun passes over them. Therefore if the screen is not refreshed often enough then it appears to flicker. Generally it is required to redraw 30 to 60 times in a second in order to avoid flicker.

GRAPHIC CARDS

A display screen must have a video display adapter attached with the computer to display graphics. It is also called video graphics card. Following are the types of graphic cards

---

[3] Shine
[4] Variety

- **CGA:** CGA stands for Color Graphic Adaptor. It supports the resolution up to 640(horizontally) by 200(vertically) pixels.

- **EGA:** EGA stands for Enhanced Graphics Adaptor. It supports the resolution up to 640 by 350 pixels.

- **VGA:** VGA stands for Video Graphic Array. It supports the resolution up to 640 by 480 pixels.

- **SVGA:** SVGA stands for Super Video Graphic Array. It supports the resolution up to 800 by 600 pixels.

- **XGA:** XGA stands for Extended Graphics Adaptor. It supports the resolution up to 1024 by 768 pixels.

DIFFERENCE BETWEEN LCD MONITOR AND CRT MONITOR

CRT Monitor	LCD Monitor
1) It is heavier than LCD monitor.	It is lighter in weight than CRT monitors
2) It is commonly used in Desktop Computers.	It is commonly used with portable computers.
3) It uses Cathode Ray Tube to display output.	It uses Liquid Crystal technology to display output.
4) It takes more desk space.	It takes less desk space.
5) Its viewing angle is not limited.	Its viewing angle is limited.
6) It is less expensive.	It is expensive.

PRINTERS

Printers are hardcopy output devices whose output can be seen as well as it can be touched. A printer gets the data from the computer (CPU) through a cable connected to a port. The port, which is used to connect printer with the CPU, is called LPT1 (Line printer 1). Now a days printer can be connected to USB ports. There are two types for printers.

1- Impact Printer   2- Non-Impact Printer

1- IMPACT PRINTERS

These are the type of printers that creates images by striking the inked ribbon. They press the ink through the ribbon onto a piece of paper. Impact printers are noisy and have less expensive. Character printers such as dot matrix and daisy wheel are the examples of such category.

1.1- Character Printers

Character printers print one character a time, which makes them slow in printing. They are capable of printing at the rate of 30 to 300 characters per seconds (cps). They are mainly used with personal computers. These types of printers have relatively low cost but they create noise while printing.

- ## DOT MATRIX PRINTERS

Dot matrix printers normally have 9 to 24 pins arranged in the form of matrix. To print a character on the paper, the built-in microprocessor activates the appropriate pins in the print head to move forward and hit the printer ribbon, which is placed against a paper. As a result, the shape of the character appears on the paper. Dot matrix printers form the shape of characters by a number of dots not with the character shape itself, therefore the print quality of these printers is low.
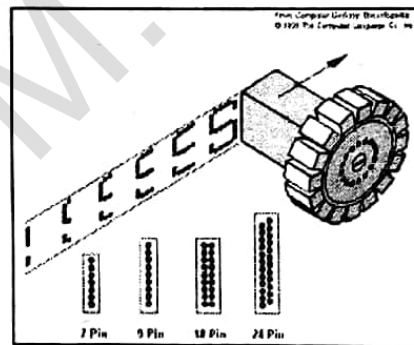
- ## DAISY WHEEL PRINTERS

The daisy wheel printer uses a wheel, like petals of daisy flower with arms, that's why it is named as daisy wheel printer. The character shapes are embossed at the outer end of the arms. To print a character, the daisy wheel rotates to bring the desired character into position in front of printer ribbon. A character is formed when hammer strikes the required character which strikes the ribbon to form the character shape on the paper. Movement of all these parts is controlled by microprocessor in the printer. Daisy wheels are available in several formats (bold letter, italic etc). The
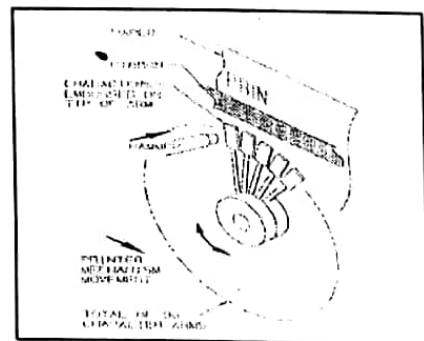
main advantage of using daisy wheel printer is that the print quality is high because exact shape of the character hits the ribbon to leave an impression on paper.

1.2) LINE PRINTER

Line printers print one complete line at a time and hence they are faster than character printers. Line printers are heavy-duty printers and they can print at the rate of 2000 line per minute. Examples of line printers are chain printers and drum printer.

• CHAIN PRINTER

A chain printer mainly consists of a long chain. The chain contains all the printable characters embossed on the chain. The chain can be moved in a circular manner with the help of two pulleys fixed on the extreme ends of the printer. Microprocessor within the printer senses when the correct character appears at the desired print position on the page. At that point, a hammer strikes the page. This action presses the paper against a ribbon and against the character located at that position. As a result the impression of character appears on the paper. When the requirements of the printed line are fulfilled, the printer moves the page to the next line position.
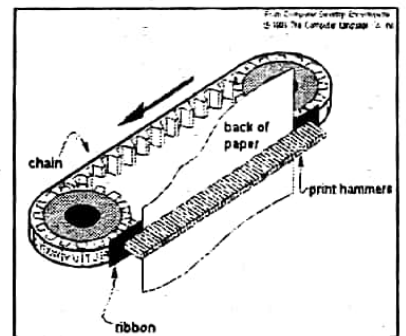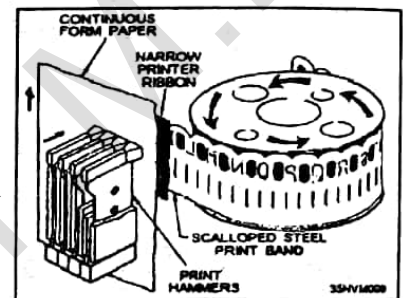
• DRUM PRINTER

A drum printer mainly consists of a cylindrical drum, having the rows of all printable characters engraved on the drum. A ribbon is placed in front of the drum. The printing page is placed in front of the ribbon. The drum has an ability to rotate and the rotation of the drum is controlled by a microprocessor of the printer. The impression of a character is created on a page by striking the page with a hammer against a ribbon, which is placed in front of the character. The quality of drum
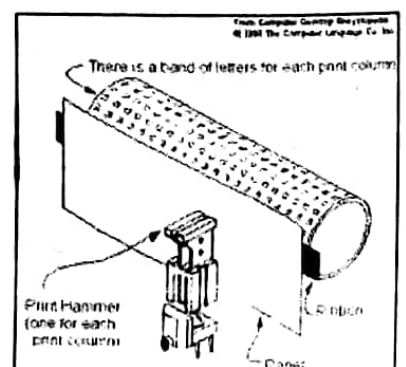
printer is better than the quality of a dot matrix printer with a greater speed as well. Although drum printer prints the characters producing good quality but it cannot support to print images.

2- NON-IMPACT PRINTERS

Non-impact printers have been developed to produce a printed image without striking the papers. Non-impact printers are noiseless and faster than impact printers. Page printer is an example of such category.

2.1) Page Printer

As the name implies page printers print entire page at a time. Laser jet and ink jet are the example of page printer.

- **LASER(*Light Amplification* by Stimulated Emission by Radiation) PRINTER**

Laser printer is a page printer, it prints an entire page at a time. It resembles photocopier in appearance and employ a similar technology. The print mechanism is as follow:

Laser jet printer uses laser light, dry ink (toner), rollers and cylindrical drum. When

a print job starts the drum begins to revolve and gets the negative charges of electricity, then the laser beam hits the drum making the invisible image of characters and neutralize those area where the image has to be printed. The toner particles stick to the neutralized surface of the drum as the toner particles have been given a negative charge. While all this is happening the printer is charging a paper with positive electric charges. When the paper moves near the drum, its positive charge attracts the negatively charged toner particles away from the drum and the image is transferred onto the paper. Then the inked paper passes through hot rollers (the fuser unit). The heat and pressure from the rollers fuse the toner particles permanently onto the paper. Lastly the printout emerges from the side of the printer.
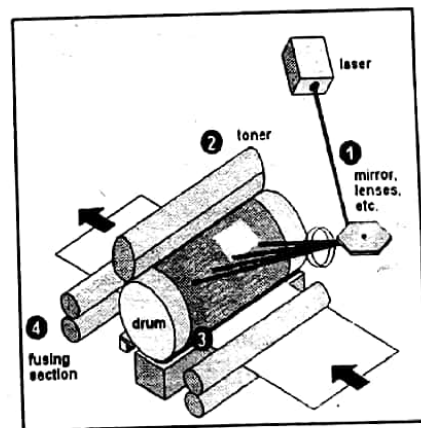
• INK JET PRINTER

Ink jet printer is a type of non-impact printer. It prints characters and graphics by spraying tiny drops of liquid ink on paper. Because the ink is put directly on the paper, therefore, these printers require ink in reservoirs[6] instead of ribbon. Ink jet printers are also available which have more than one ink reservoir, each with different color for printing colorful images. Inkjet printers can produce quality text and graphics including photographs.

DIFFERENCE BETWEEN IMPACT AND NON-IMPACT PRINTER

Impact Printers / Dot-Matrix Printer	Non-Impact Printers/Laser Printer
1) They print output by directly striking the print hammer against an inked ribbon.	They print output without striking the paper with print hammer.
2) They produce noise while printing.	They don't produce noise while printing.
3) They are slower in printing.	They are faster in printing.
4) They have low print quality.	They have high print quality.
5) They use ink ribbon for printing output.	They use powdered ink or liquid for printing output.
6) It is less expensive.	It is more expensive.
7) Dot Matrix is an impact printer.	Laser printer is a non-impact printer.

PLOTTERS

Plotters are special output devices that are used for a variety of applications, which include architectural drawings, graphs, making maps, plotting civil engineering drawings etc. Plotters work on the principle of human hand holding a pen and moving it on paper. Plotters are normally very slow output devices but they still plot much faster than a draughtsman and the output is of better quality. Plotters are of two types:

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[6] Container

1- Flatbed Plotter   2- Drum Plotter

1- FLATBED PLOTTER

Flatbed plotters plot on paper that is lying flat on a table-like surface. Typically, the plot size is equal to the area of a bed. The bed size varies according to the need. Most of the flatbed plotters have one to four pens or pencils of different colors. These pens can be raised or lowered onto the paper and move across the paper to draw charts or graphs.
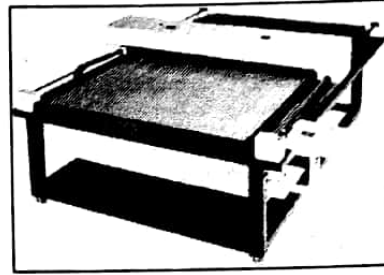
2- DRUM PLOTTER

Drum plotters are normally used with mainframe and minicomputers. The paper is placed over a drum that rotates back and forth to produce vertical motion and the drawing pens are mounted on a carriage, which moves across the width of the paper to plot the graph or different design on the paper.
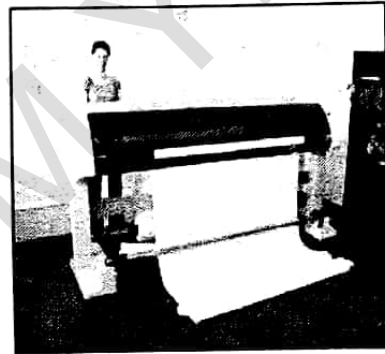
NUMBER SYSTEM

Different number systems are used in computer system for different purposes. The main number systems are as follows:

1- DECIMAL NUMBER

Deci is a Latin word which means ten hence this number system consist of 10 digits from 0 to 9.

2-BINARY NUMBER

Binary number consists of 0 and 1. It is the mostly used number system in digital computer. We can say that this number system is actually the language of computer.

3- OCTAL NUMBER

The Octal number system consists of 8 digits from 0 to 7. The number next to 7 will be 1 0,1 1 and so on.

4- THE HEXADECIMAL NUMBER

The hexadecimal number system consist of 16 digits i.e. 0,1,2 ... 8,9, A, B, C, D, E and F. The alphabets A, B, C, D, E and F are used to represent decimal numbers 10, 11, 12, 13, 14, 15 respectively.

TEXT CODES / CODING SCHEME

Text Code is a system that enables any programmer or program to use the same combinations of numbers to represent the same piece of data. EBCDIC, ASCII, and Unicode are the most popular text code / Coding schemes.

1- EBCDIC

The EBCDIC (Extended Binary Coded Decimal Interchange Code) is an 8-bit code and can provide 256 different symbols. EBCDIC is still used in mainframe and midrange systems, but it is rarely encountered in personal computers.

2- ASCII

ASCII (pronounced as *AS-key*) stands for American Standard Code for Information Interchange defined by ANSI (American National Standards Institute). It is of two types ASCII-7 and ASCII-8. ASCII-7 uses 7 bits to represent 128 different characters. ASCII-8 is an 8-bit code and provides 256 different symbols to represent. ASCII codes are the most commonly used codes in personal computers.

3- UNICODE

The Unicode standard was developed in 1991 by a joint engineering team from Apple Computer Corporation and Xerox Corporation. It provides 2 bytes (16 bits) to represent each letter, number, or special symbol. With 2 bytes, more than 65,536 different character or symbols can be represented. This total is enough for every unique character and symbol in the world, including the vast Chinese, Korean, and Japanese character sets.

SOFTWARE

The set of instructions that tell the computer what to do. OR The set of interrelated programs developed to perform a specific task is said to be software.

TYPES OF SOFTWARE

There are two main types of software

1- APPLICATION SOFTWARE

Application software is the software that enable and facilitate the users to perform specific tasks such as typing application, preparing students mark sheet, playing games etc. Application software is normally supplied as a package that consists of more than one software. MS-Office is an application software package that consists of MS-Word, MS-Excel, MS-PowerPoint etc. The application package also consists of the CD ROMs, a manual and training material. The application software can be of general use in every organization or it can also be developed to use in specific organization i.e the software developed for NADRA, stock exchange, banks etc.

2- SYSTEM SOFTWARE

System software consists of programs that controls the computer hardware and make the use of computer more effective. Operating Systems and Device drivers are the examples of System software. Without system software like Operating System, the computer would be very ineffective and very difficult to operate. Moreover without hardware driver of specific device, it is not possible to work on that device for example if we connect printer to the computer and we don't install its driver then it is not possible to get prints from that printer.

SHAREWARE

Software that can be used without being registered or without paying fee for a ;'specified\ time period is known as shareware. After that time the user has to purchase the software in order to use it further.

FREEWARE

Software that is freely available for use. Freeware publishers allow users to distribute their software to others as long as the software's source files are not modified.

INFORMATION SYSTEM

It is a system of an organization which provides timely Information for decision making, progress reporting, planning and evaluation of programs etc. It can be either manual or computerized, or a combination of both.

INFORMATION SYSTEM DEVELOPMENT

The information system is developed following the 5 phases of **SDLC(System Development Life Cycle)** which are as follows:

1- SYSTEM ANALYSIS

In this phase of SDLC, the current system is studied in detail. The data is collected about the system to be developed. The current data is analyzed and specifications of what the system is required are made.

2- SYSTEM DESIGN

In this phase specifications are converted into different types of charts/diagrams such as ERD(Entity Relationship Diagram), DFD(Data Flow Diagram), Flow charts etc.

3- SYSTEM DEVELOPMENT

This phase is further subdivided into two phases as follows:

i) Coding/ Writing

In this phase, the actual codes of software are written with the help of provided charts and diagrams. For coding suitable programming language must be chosen.

ii) Testing

The main purpose of the testing phase is to detect and remove errors in the program and to check whether the code written is giving the required result or not.

4- SYSTEM IMPLEMENTATION

In this phase the developed system is installed for where it was developed. In addition the user training about the developed software is also a part of this phase.

5- SYSTEM MAINTENANCE

It refers to the necessary changes to be made in the system which would be necessary because of changing requirements, technologies and experience with system's use.

DIFFERENCE BETWEEN HARDWARE AND SOFTWARE

Hardware	Software
1) Physical parts of the computer are known as hardware.	Non-physical parts or set of instructions are known as software.
2) We can touch, see and feel the hardware.	We cannot touch and feel the software.
3) If the hardware is damaged it is replaced with new one.	If software is corrupted it can be reinstalled.
4) It operates under the control of software.	It controls the operation of hardware.
5) Hardware can not affected by viruses.	Software can be affected by the viruses.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) Vacuum tubes were used in _____ generation.
2) CRT stands for_____.
3) Set of instructions is called _____.
4) The data after processing is known_____.
5) Laser printer is a type of_____ printer.

Answer

1) 1ˢᵗ	2) Cathode Ray Tube	3) Software	4) Information	5) Non-Impact

Q1b) Tick the correct option.

1) _____ is an input device.
    A- Mouse   B- Keyboard   C- Joystick   D-All
2) Program designed to perform specific task is called _____software
    A- System   B- Application   C- Antivirus   D- None
3) A piece of hardware that temporarily hold data and program is called_____
    A- Primary storage   B- Secondary storage   C- CPU   D-Output
4) Which of the following key is used to cancel operation?
    A- Arrow   B- Caps lock   C- Num lock   D-Esc
5) Computer Programs that run on a computer are referred to as _____
    A- Hardware   B- Instructions   C- Software   D-None

1) D	2) B	3) A	4) D	5) C

CHAPTER 2
COMPUTER NETWORKS

NETWORK

Two or more than two interconnected computers/nodes[7] that share the resources are known as a computer network. Computer network consist of computer, some other devices, the physical or logical connections between them and the software required to enable them to communicate with each other and share the resources.

On a network computer play one of two roles as follows:

- **SERVER**

Computer on the network that offers or shares their resources for other computers is known as a server.

- **CLIENT**

Computer on the network that accesses resources, which are being shared by other computer, is known as client computer or simply client.

BENEFITS / ADVANTAGES OF NETWORK

1- Information Sharing

The main advantage of a network is information sharing. Without a network it is quite difficult to share the information. With the help of network we can share and transfer the information from one point to another.

2-Hardware Sharing

Hardware resources such as printer, hard disks etc can also be shared over the network. Printers and hard disks are relatively expensive devices, As a result sharing printer or hard disk became a primary use of networks. Apart of printer and hard disk other hardware devices can also be shared over a network and used by a number of computers on a network.

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[7] Any device connected to the network is known as a node

3- Saving Money

We can share expensive devices such as printers, plotters, scanners, and hard disks etc to multiple users of networks which saves large amount of money. Fewer devices also mean fewer maintenance charges, services charges and upgrade cost.

4- Back-up

Back up means a true copy of the data. In Organizations where data is very important and it's lost is unbearable. The back up of each and every transaction[8] is kept in different computers on a network, so that if one computer gets out of order the data can be recovered from other.

DISADVANTAGES OF NETWORK

1- A person (network administrator) is required to look after all the activities of the network.

2- Extra equipments (devices) are required to connect computers, which makes the network very expensive.

3- Viruses can be easily transferred from one computer to another through network.

TYPES OF NETWORK

1- Server based (Dedicated Server)   2- Peer-to-Peer

1- SERVER BASED (DEDICATED SERVER)

In a dedicated server network, one or more computers are dedicated to act as servers and provide quick access to shared resources. Dedicated server networks provide centralized control of data and other resources. Moreover it provides centralized security to ensure that unauthorized users do not access resources.

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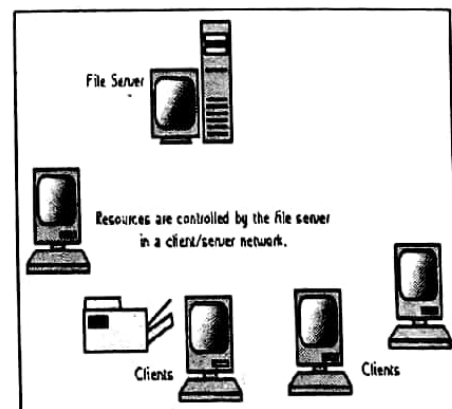
[8] Operation

2- PEER-TO-PEER NETWORK

In a peer-to-peer network, every computer can act as a client, server or both at the same time. In this type of network, each computer is referred to as peer or peer computer. So each peer computer can share files and printers with other computers and it can also access other shared resources on the network. Large peer-to-peer networks become difficult to manage because so many network administrators are required for sharing and maintaining the resources.

Resources are shared among equals in a peer-to-peer network.
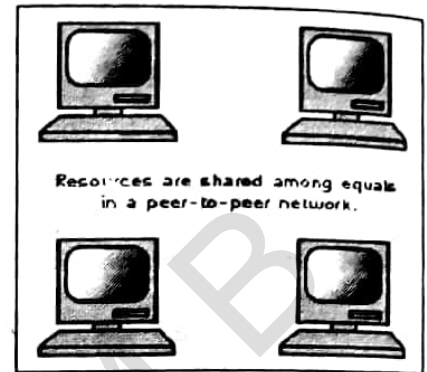
TYPES OF NETWORK (w.r.t. Area)

1- LAN

LAN stands for Local Area Network. It is a type of network spread over a limited area of some meters to a kilometer. Usually a LAN is spread with in an organization. In other words we can say that a network with in a building is known as a LAN. Computers in a LAN are connected with each other either through physical cable or some wireless media like infrared rays.

2- WAN

It stands for Wide Area Network. It is a type of network connecting the cities, states, and countries. Internet is the best example of WAN. Computers in a WAN are connected with each other through physical cables and wireless media like microwaves. Two or more interconnected LANs are also said to be a WAN.

3- MAN

MAN stands for Metropolitan Area Network that is a link between offices buildings in a city or town and covers a smaller geographical area than WAN. MAN is typically not owned by a single organization rather it is owned by a group of organizations who jointly own and operate the network.

DIFFERENCE BETWEEN LAN AND WAN

LAN	WAN
1) Covers small geographical area.	Covers large geographical area.
2) Computers are directly connected through physical cable or with wireless medium.	Computer can be connected through various mediums and technologies.
3) Ethernet card is used for data transmission.	Modem is used for data transmission
4) Data transmission speed is very high.	Data transmission speed is low.
5) Less possibility of data transmission errors.	Higher possibilities of data transmission errors.

NETWORKING SOFTWARE

Computer networks require a combination of both hardware and software. Once the network is established, then there is a need of Network Operating system to make it work. Network Operating system is such operating systems, which have built-in networking features. These features are required to communicate over the network with other computers, to access network recourses and to share them. Windows 2000, Windows NT are the examples of Network operating systems.

WORKGROUP

A group of people working on a project / task on a network is known as a workgroup. Exchanging and sharing of information by various member of a workgroup over the network is called **Workgroup Computing.** The members of the workgroup may be located in different cities or even different countries. They can share and discuss their ideas and experiences over the computer network. They can also exchange text, sound images and videos.

GROUPWARE

Groupware is the software that supports workgroup computing. It provides facilities for users to work together on both Local Area Network and Wide Area Network. E-

mail, Scheduling and Contact-Management, Teleconferencing are some of the commonly used groupware.

TOPOLOGY

The way in which the network connections are made is called network topology. Network topology specifically refers to the physical layout or design of a network. Following are the common network topologies

1- Bus Topology　2- Star Topology　3- Ring Topology　4- Mesh Topology

1- BUS TOPOLOPY

All the computers in Bus topology are connected with each other through a single cable known as a bus.

Working:

Before the transmission of data on bus network, the process of **"Handshaking"** is performed between sending and receiving computers. After the successful handshaking, the data is sent by source computer to all the computers on the network but only one whose address matches with the message accepts the data. The rest of computers disregard the message.
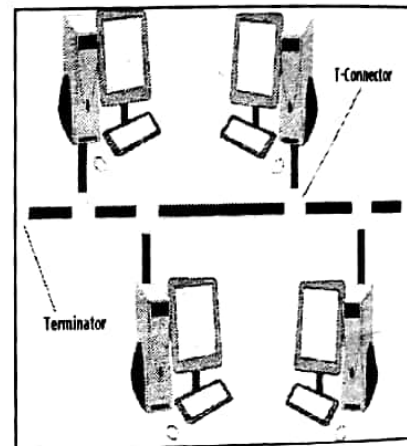
　Only one computer at a time can send message therefore the number of computers attached to bus network can significantly affect the speed of network because computers must wait until the bus is free before they can transmit data.

　Another important issue in bus topology is **termination**; the electrical signal of a transmitting computer is free to travel the entire length of a cable. With out termination, when the signals reaches at end of the wire it bounces back and travels back up to the wire. The signal echoes back and forth along an un-terminated bus is called **ringing**, to stop the signal from ringing the terminators are attached at both end of the bus, the **terminator** is a device that absorb the free electrical signal and stop reflection.

Advantages of Bus Topology

1- The bus is simple and easy to understand.

2- It is reliable in small networks.

3- The bus requires the least amount of cable to connect the computers.

4- It is less expensive because a single cable is required to connect computers.

5- The bus network is easy to extend, two cables can be joined with a Connector.

Disadvantages of Bus Topology

1- Heavy network traffic can slow down a bus because any computer can transmit data at any time and other computers must wait until the bus gets free.

2- Each Barrel connector weakens the signal and too many prevent the signal from being correctly received all along the bus.

3- If there is a problem with the main cable, the entire network goes down.

2- STAR TOPOLOGY

In a star network topology the computers are connected to a central device called a hub or switch. Hubs / Switches typically have 4 to 48 ports to connect the devices with it.

Working:

Each computer on a star network communicates with a central device that could be a hub or switch. If the hub is attached to the network then the message will be broadcasted to all the computers and if the switch that is also known as intelligent hub is attached then the message will be regenerated and sent only to the destination computer.
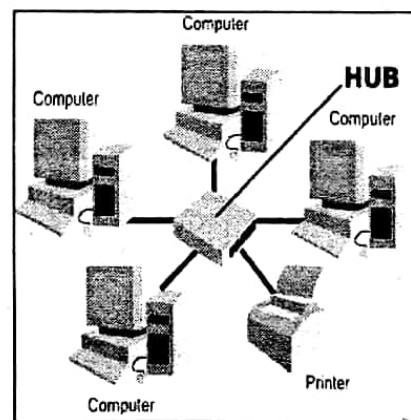
Advantages of Star Topology

1- It is easy to modify and add new computers to a star network without disturbing the rest of the network.

2- The center of a star network is a good place to diagnose network faults.

3- Single computer failure does not bring down the whole star network.

Disadvantages of Star Topology

1- If the central hub fails, the whole network fails to operate.

2- Star networks require extra device at the central point to rebroadcast or switch network traffic.

3- It costs more to cable a star network because all network cables must be pulled to one central point.

3- RING TOPOLOGY

The ring network topology is shaped just like a ring. It is made up of an unbroken circle of network computers / nodes. Each node is directly connected to its two immediate neighbors. A Ring topology is also called a circular bus.

Token Ring Network
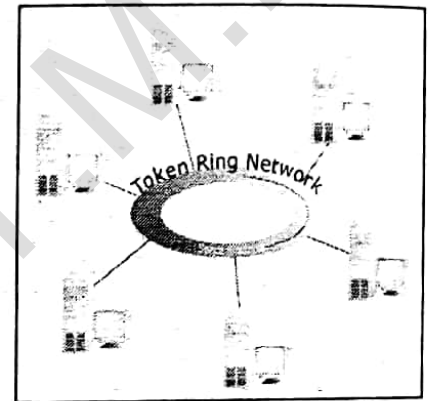
Working

A short message called a token is passed around the ring until a computer wishes to send information to another. That computer modifies the token, adds an electronic address and data, and sends it around the ring. Each computer in sequence receives the token and information and passes them to the next computer until either the electronic address matches the address of a computer or the token returns to its origin. The receiving computer returns a message to the originator indicating that the message has been received. The sending computer then creates another token and places it on the network, allowing another station to captures the token and begins transmitting. The token circulates until a station is ready to send and captures the token. This all happens very quickly, a token can circle a ring of 200 meters a diameter at about 10,000 times a second.

Advantages of Ring Topology

1- The ring is easy to implement.

2- There is very rare chances of data lose.

3- The ring is less expensive in small networks because a single cable is required to connect the computers but in large networks it can be costly.

Disadvantages of Ring Topology

1- Failure of one node affects the whole network.

2- Ring is difficult to troubleshoot.

3- Adding or removing computer can stop the activities of the network.

MESH TOPOLOGY

A Mesh topology which is also known as completely connected network has a separate physical link for connecting each node to any other node. Thus each computer of such network has a direct dedicated link, called point-to-point link with all other computers of the network.
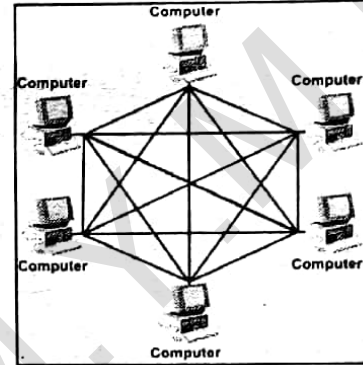
Advantages of Mesh Topology

1- This type of network is very reliable, as any line breakdown will affect only communication between the connected computers.

2- Communication is very fast because various routes are available to send information from one point to another.

Disadvantages of Mesh Topology

1- It is the most expensive network because a lot of cable is required to connect a computer to every other computer.

2- Difficult to troubleshoot.

ISO

ISO stands for International Standards Organization that specifies standards for data communication and networks. In the early 1970s the ISO developed standard model of data communication system called Open Systems Interconnection (OSI) model.

OSI

OSI stands for Open Systems Interconnection. It consists of seven layers. OSI model was developed to facilitate a communication system in which equipment from different vendors can communicate with each other. It also describes the flow of data from one computer to another. The seven layers of OSI model are as under:

1- Physical Layer

It is the first or bottom layer of OSI model. This layer is responsible for establishing physical link between computers. The electrical signaling, wiring and signaling standards that defines which pin on a connector does what and what will be the voltage are also related to this layer. Moreover representation of bits into signals, defining the data rate and the transmission mode is also the functionality of physical layer.

2- Data-link layer

It is the second layer of OSI model that is responsible of linking data with transmission line. It is also responsible for recognizing errors and controlling the flow of data. In this layer packets are referred to as frames. It also provides the physical addressing i.e MAC address.

3- Network layer

It is the third layer of OSI model. The responsibility of this layer is to choose the best available route/path to transmit data. It is not necessary that the shortest route must be the best route. A longer idle route will be the best route if the shortest route is too busy to be used. It also provides logical addressing (IP addresses) for computers.

7	**Application Layer** ✓ Message format. Human-Machine Interfaces
6	**Presentation Layer** ✓ Coding into 1s and 0s: encryption compression
5	**Session Layer** ✓ Authentication, permissions, session restoration
4	**Transport Layer** ✓ End-to-end error control
3	**Network Layer** ✓ Network addressing; routing or switching
2	**Data Link Layer** ✓ Error detection, flow control on physical link
1	**Physical Layer** ✓ Bit stream: physical medium, method of representing bits

4- Transport layer

It is the fourth layer of OSI model that is responsible of grouping / dividing the data into segments. It ensures that the data received is in the right format and in the right order. Transport layer also sends an acknowledgement of receiving of data to the sender.

5- Session layer

It is the fifth layer of OSI model and is responsible of managing the data security to avoid illegal access of data. This layer contains related user name, password etc for their verification. The session layer can provide check pointing mechanism for the transfer of data. If failure occurs, then only the data from the last check point is re-transmitted.

6- Presentation layer

It is the sixth layer of OSI model and responsible for making the data compatible on both source and destination for example if the source computer is working on ASCII code formats while the destination computer is working on Unicode then the presentation layer makes them compatible by providing optimal accuracy. Encryption / Decryption and Compression are also the functionalities of presentation layer.

7- Application layer

It is the last or top layer of OSI model, which provides the interface to a user for communication. It is where the network operating system and application programs reside. In other words it provides a screen where the user makes the data communications.

PROTOCOLS

Protocol is a set of rules for the exchange of data between computers. Major responsibility of protocol is to control that how the sending computer sends the data and how the destination computer receives the data. Already existed protocols are known as **De-facto** and protocols that are developed after research are known as **De-jure** protocols.

ELEMENTS OF PROTOCOL

Following are the key elements of a Protocol:

i) Syntax

Syntax specifies the format or structure of data. The data is accepted according to the pre-defined format. For example the protocol syntax may specify that the first 8

bits refer to the sender's address, second 8 bits refer to the receiver, and rest will be the actual data.

ii) Semantic

Semantic means "meaning". It refers to the meanings of each section of the bit stream and also specifies the information structure needed for the coordination among machines.

iii) Timing

Timing refers to the speed matching, so that a computer with a 33 kbps can talk to one with a 56 kbps and it also refers the proper sequencing of data, in case the data arrives out of order.

TCP / IP

TCP / IP stand for Transmission Control Protocol / Internet Protocol is a suite of protocols that must be installed in the computer to access the internet. In other words we can say that TCP/IP is the language of internet through which the communication between computers became possible.

TCP is responsible for verifying the correct delivery of data from computer to computer. Data can be lost in the intermediate network, therefore TCP adds support to detect errors of lost data and to trigger retransmission until the data is correctly and completely received.

IP is responsible for moving packet of data from node to node. IP forwards each packet based on a destination address (the IP number).

X.25 PROTOCOL

X.25 protocol defines how communication devices such as routers package and route data when the router is used in packet switching network. It is a Packet Switching Protocol Standard mostly used in packet switching networks which enables computers on different networks to communicate through an intermediary computer.

SWITCHING

Is an important technique that can determine how connections are made and how data movement is handled on a WAN. Data sent across inter-networks with the help of intermediate nodes. These nodes provide switching facility that moves data from node to node until the destination is reached. Three major switching techniques are available to establish connection between data sources and receivers in a communication network that are as follows:

1- Circuit Switching   2- Message switching   3- Packet Switching

1- CIRCUIT SWITCHING

It is the simplest method in which a dedicated physical connection is established between the sender and the receiver and maintained for the entire conversation. For example, the old PSTN (Public Switched Telephone Network) uses a circuit switching technique. When a call is made, a physical link between the two phones is

Circuit Switching in a Telephone Network

Many paths are possible, but only one path is selected per call.

Once a call is established, all communication takes place on this path, or circuit. A circuit is dedicated to this call for the duration of the call.

The circuit stays active, even if no one is speaking.

Telephone Network
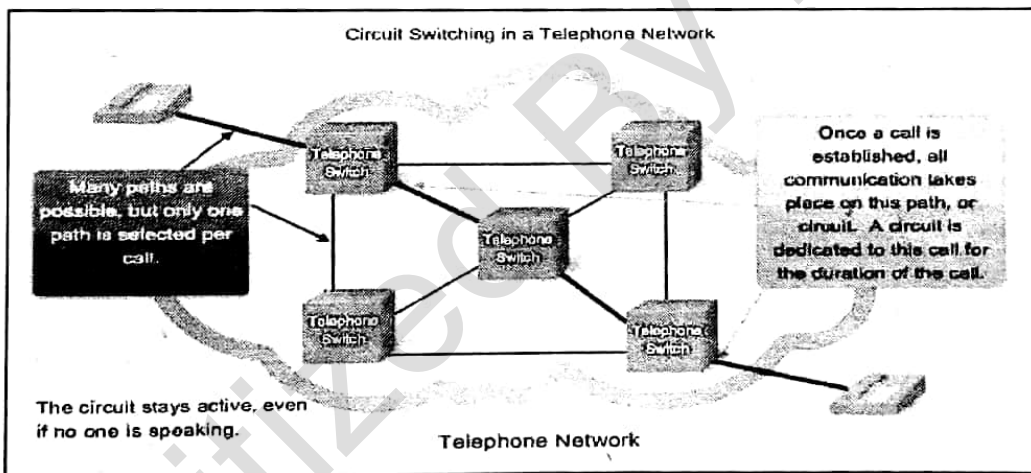
dedicated during the entire conversation and exists until the call is terminated either by the sender or receiver. The major advantage of circuit switching is that once the circuit is established then the data is transmitted with no delay. Since a dedicated link is made to one source for the entire duration of conversation, hence the network resources are not properly utilized.

2- MESSAGE SWITCHING

Message switching is unlike circuit switching because it does not establish a dedicated path between two communicating devices. Each message is treated as an independent unit and includes its own destination and source addresses. Each complete message is then transmitted from device to device through the inter-

network. Each intermediate device receives the message, stores it until the next device is ready to receive it, and then forwards it to the next device. For this reason message switching network is referred to as store-and-forward network. E-mail is the best example of message switching. An e-mail message is forwarded as a complete unit from node to node until it reaches to the correct destination.
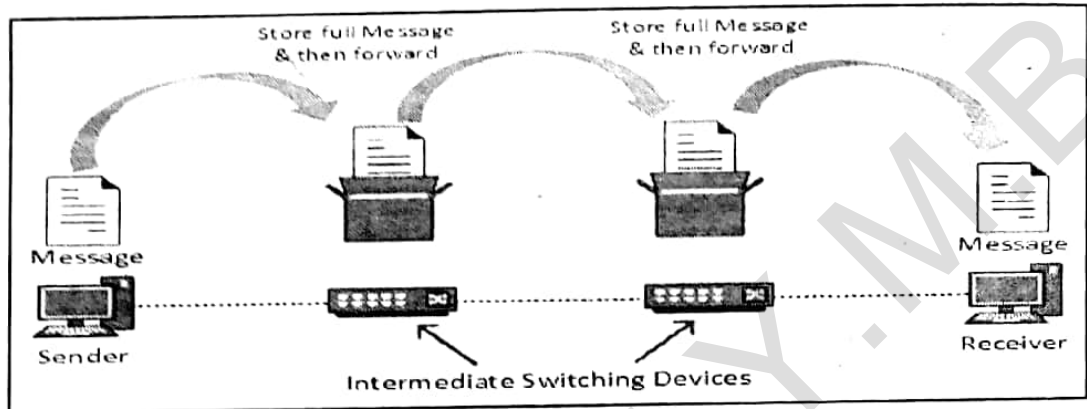
3- PACKET SWITCHING

Packet switching provides the advantages of circuit switching and message switching and avoids the main disadvantages of both. In packet switching, messages are broken up into packets, each of which includes a header that contains source
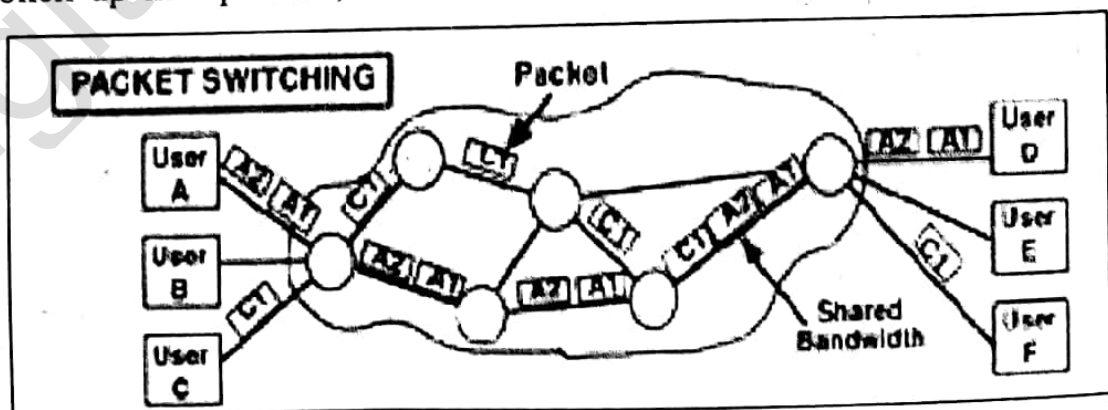
address, destination address, packet number etc. Each packet is sent through intermediate nodes along the best route available between source and destination.

Each packet may travel choosing different available path and the packets composing a message may arrive at different times or out of sequence, so the receiving computer reassembles the packets using the packet sequence to compose an original message. X.25 is a standard / protocol that is used in Packet switching. Communication over the Internet is the example of Packet switching.

IEEE

Stands for Institute of Electrical and Electronics Engineers that has developed set of standards / Protocols describing cabling, physical topology and access scheme of network products. These standards are known as 802.x standards, where x is a sub committee or protocol name.

802. 3 (Ethernet)

802.3 is also known as Ethernet protocol. The Ethernet protocol implements in a bus network topology. **CSMA/CD** (Carrier Sense Multiple Access with Collision Detection) access method is used to regulate network traffic by allowing a transmission only when the wire is free and no other computer is transmitting data.

802. 4 (Token Passing Bus)

802.4 is also known as token passing bus protocol. The token passing bus protocol implements bus network where each computer receives the information but only the addressed computer responds.

802. 5 (Token Ring)

802.5 is also known as token ring that describes the token ring architecture. This standard describes a toke passing mechanism used in a ring topology where each node is connected in a special way like a ring.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) Computer network require a combination of _____ and _____.
2) In a star topology all computers are connected to a central device called_____.
3) IEEE standard _____ describes the token ring architecture.
4) Many networks include a central computer that is called_____.
5) WAN stands for_____.

Answer

| 1) Software, Hardware | 2) Switch/Hub | 3) 802.5 | 4) Server | 5) Wide Area Network |

Q1b) Tick the correct option.

1) The set of rules to exchange data in a communication network is called_____.
   A- Gateway   B- Procedure   C- Protocol   D- Token

2) Each computer on a network is called a_____.
   A- Bus   B- Terminator   C- Node   D- None

3) Which layer of OSI model furnishes electrical connection and signaling?
   A- Network   B- Data link   C- Physical   D-Transport

4) LAN stands for_____?
   A- Local Area Netware   B- Local Area Network   C- Local Area Netware   D-None

5) The layer that is concerned with physical path is called_____ layer.
   A- Network   B- Data link   C- Physical   D-Transport

| 1) C | 2) C | 3) C | 4) B | 5) A |

CHAPTER 3
DATA COMMUNICATION

DATA COMMUNICATION

The transfer of data or information from one location to another through a physical or logical connection is called data communication.

| Transmitter | Medium | Receiver |
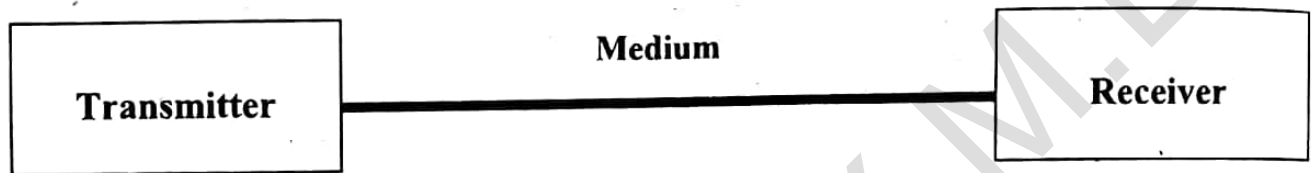
Data Communication Model

BASIC ELEMENTS OF DATA COMMUNICATION SYSTEM

Data Communication consists of three basic elements as follows:

1- TRANSMITTER

The point (computer or device) that is used for sending data is called transmitter or sender.

2- MEDIUM

Transmission Medium is the means through which data is sent from one location to another. If the receiver and transmitter both are within the same building then commonly usually wires are used to connect them. If they are located at different locations then they are connected by means of telephones lines, fiber optics, microwaves etc.

3- RECEIVER

The point (computer or device) that receives data sent by a transmitter is called receiver. The receiver can be a computer, printer or a fax machine.

DATA COMMUNICATION MODES

Mode of data communication means the way in which the process of data communication takes place. Data communication modes depend upon the nature of transmitting device, receiving device and medium. There are three modes of communication as follows:

1- SIMPLEX MODE

In this mode of communication the data is transmitted in only one direction from a sender to receiver. Moreover the receiver cannot transmit the data back to the sender. Radio and television broadcasting are examples of simplex transmission.

Transmitter	→	Receiver
	(On one direction only)	
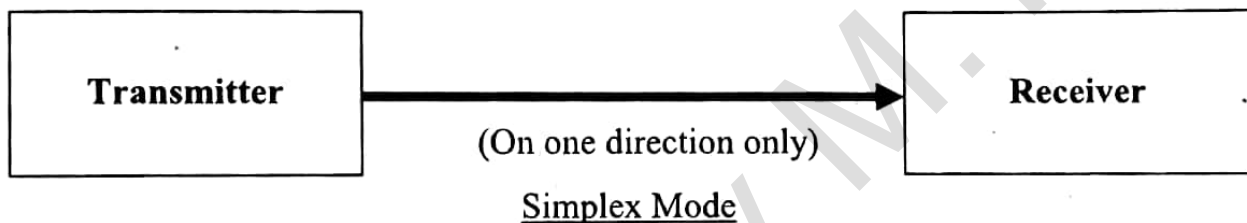
Simplex Mode

2- HALF-DUPLEX MODE

In a half-duplex mode the data can be sent and receive in both directions but not simultaneously. In this mode both the points act as transmitter as well as receiver. Police Wireless set works on half-duplex mode.

Transmitter / Receiver	▪▪▪▪▪▪▪▪▪▪▪▪▶ ◀▪▪▪▪▪▪▪▪▪▪▪▪	Receiver / Transmitter
	(In both direction but not simultaneously)	
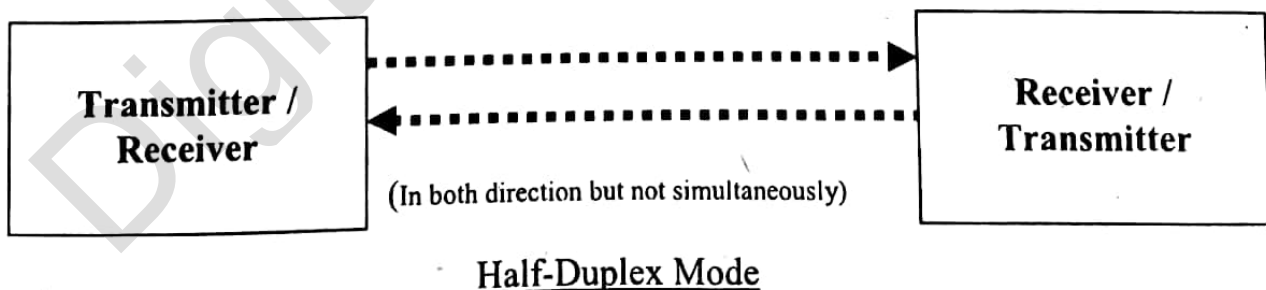
Half-Duplex Mode

3- FULL-DUPLEX MODE

In a full-duplex mode the data can be sent and received in both directions simultaneously. A full-duplex line is equal to two simplex lines one in each direction. Full-duplex line is the fastest line because the data can be sent and received simultaneously. Telephone communication works on full-duplex mode.

```
┌──────────────┐                              ┌──────────────┐
│              │ ──────────────────────────►  │              │
│ Transmitter /│                              │  Receiver /  │
│   Receiver   │ ◄──────────────────────────  │ Transmitter  │
│              │   (In both direction simultaneously) │      │
└──────────────┘                              └──────────────┘
```

(In both direction simultaneously)

Full-Duplex Mode
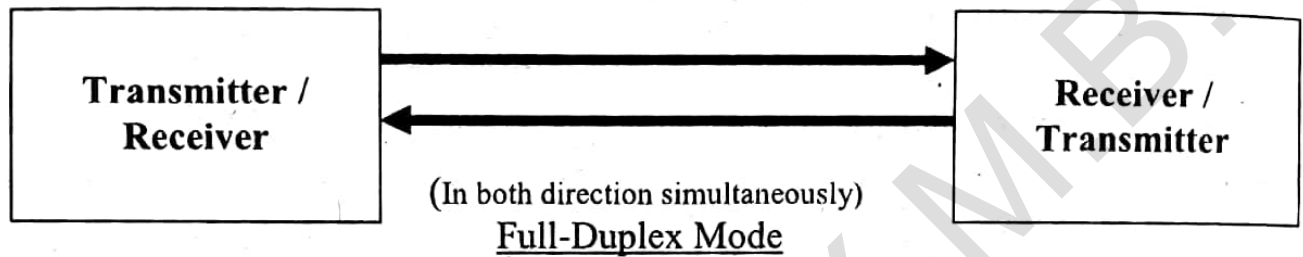
COMMUNICATION MEDIA

Data is transmitted from terminal to a computer system or from the computer to a terminal using some communication lines. These lines are actually a physical or logical path between the transmitter and receiver. Some of the most commonly use Guided (using physical cables) or Unguided (Microwave, Satellite) Communication mediums are as follows:

1- Telephone Lines   2- Coaxial Cables   3- Twisted Pair Cable

4- Fiber Optics Cable   5- Microwave transmission   6-Satellite Communication

1- TELEPHONE LINES

Telephone lines are the oldest medium used in communication. The entire world has been interconnected already through the telephone lines, so these lines can also be used for the communication of data between the two computers.

2- COAXIAL CABLE

Coaxial cable is another communication media, which is widely used for cable TV. There are two conductors (made up of copper) in coaxial cable. One is a single wire in the center of the cable and

COPPER WIRE
INSULATION
COPPER MESH
OUTSIDE INSULATION

the other is a wire mesh shield that surrounds the first wire with an insulator in
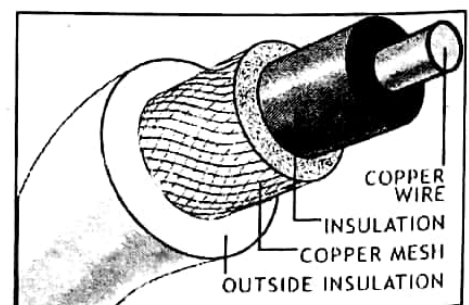
between. It is mostly used for long distance transmission. Coaxial cables support transmission speed from 10 Mbps to 100 Mbps for long distance up to 500 meters.

3- TWISTED PAIR-CABLE

These are commonly used in local telephone communication and for short distance data communication such as in Local Area Network to connect less number of computers. Twisted-pair cable uses one or more pairs of twisted copper wires to transmit signals. Twisted pair cables support transmission speed from 4 Mbps to 1 Gbps over a distance of 100 meters. There are two types of twisted pair cable as follows:

• Unshielded Twisted-Pair Cable

Unshielded twisted-pair (UTP) cable consists of a number of twisted pairs with a simple plastic casing. The UTP cables are mostly used in small computer networks because it is less expensive than other communication medium.

• Shielded Twisted Pair Cable

The only difference between shielded twisted-pair (STP) and (UTP) is that STP cable has a shield (usually aluminum shield) between the outer jacket casing and the wires. The STP is expensive but reliable than UTP.
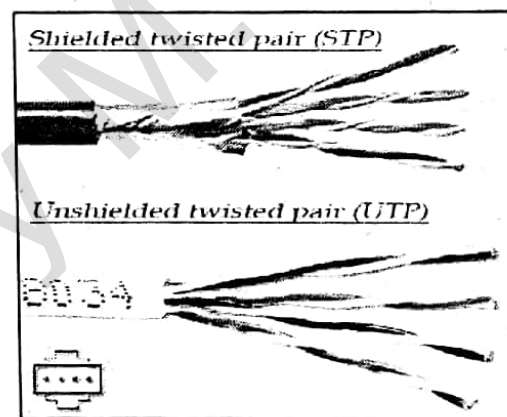
4- FIBER OPTICS

Fiber optics is relatively new technology that is replacing conventional wire and cable in communication systems. The typical fiber optic cable consists of a number of thin wires of glass called **Core** on which the data is transmitted in the form of light. The thickness of each wire is about the thickness of a hair. The core is surrounded by a concentric layer of glass called **Cladding.**
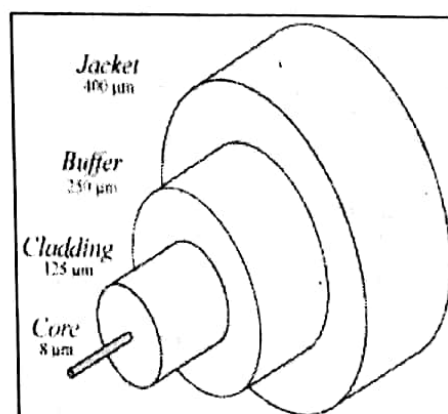
The communication through fiber optics the transmitter side has a converter that converts electrical signals into light waves and these are transmitted over fiber optics. Another converter is placed at the receiving end that converts the light waves back to electrical signals. Fiber optics provides high quality transmission at a very high speed and it also supports multiple data transmission. Now a day Fiber Optic cables support transmission speed from 6 Gbps to 10 Gbps.

5- MICROWAVE TRANSMISSION

Microwave transmission signals travel through open space much like radio signals. They provide a much faster transmission rate than is possible with either telephone lines or coaxial cables. Microwave systems transmit information with transmitters, which are normally installed on high buildings, mountains top or high towers. Long distance microwave channels consist of a series of relay stations (boosters) spaced approximately 30 miles apart. Two stations must be within sight of one another. For transmitting information long distances, signals are amplified and re transmitted from station to station.

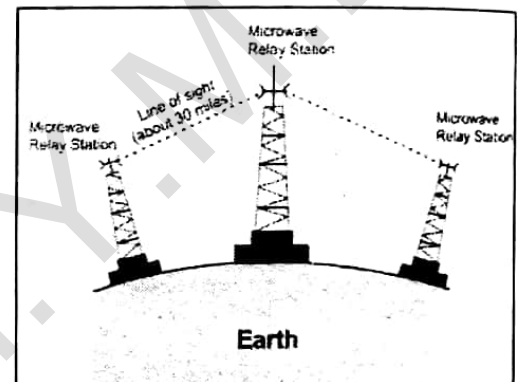## 6- SATELLITE COMMUNICATION

Satellite communication is quickly gaining importance as a means for data communication. Communication Satellites are positioned in space approximately at 22,000 miles above the earth. These satellites serve as relay stations for the transmission of signals generated from the earth.

Satellites communication is ideal for long distance communication. Earth stations consisting of ground antennas beam signals to the satellite. The satellite amplifies and
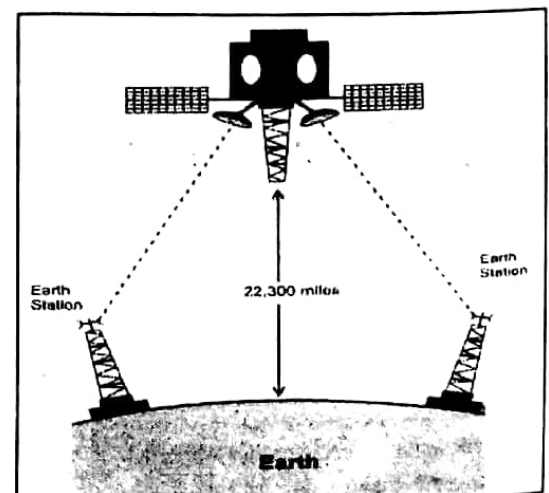
retransmits the signals to another earth station, which can be located many thousands of miles away. Transmission by satellite allows large amount of data to be sent long at rapid speeds. Its use has increased dramatically in recent years. However, a major drawback of satellites communication has been the high cost of placing the satellites into its orbits. These satellites are launched either by rockets or by space shuttles and precisely positioned in the space with an orbit speed that exactly matches with the rotation speed of the earth. Therefore, it is stationary relative to earth and always stays over the same point on the ground. This allows a ground station to aim its antenna at a fixed point in the sky.

INFRARED

Infrared uses infrared light waves to communicate over short distances. It sometimes referred to as line of sight communication because the light waves can only travel in a straight line. This requires that sending and receiving devices must be in clear view of one another without any obstructions. Infrared is used in remote controls, infrared mouse, infrared keyboard etc.

BLUETOOTH

Bluetooth is a short range wireless communication standard that uses microwaves to transmit data over short distances of up to 33 feet. Unlike traditional microwaves, Bluetooth doesn't require line of sight communication. Rather it uses radio waves that can pass through nearby walls and other barriers. This technology is mostly used in mobile communication.

COMPARISON OF FIBER OPTICS, TWISTED PAIR CABLE AND COAXIAL CABLE IN TERMS OF SECURITY, SPEED AND PRICE.

Security

Fiber optic cable is the most secure transmission medium. It is harder to tap. On the other hand twisted pair cable and coaxial cable are easily intercepted.

Speed

Fiber optic cable has the highest possible data transmission speed. Data can be transmitted up to 10 Gbps. Twisted pair cable can support data transmission speed upto 1 Gbps and coaxial cable can support data transmission rates up to 100Mbps.

Price

Coaxial cable is the least expensive media for data communication. Twisted Pair is more expensive than coaxial cable but less expensive than fiber optic cable. The most expensive cable is the fiber optic cable.

COMMUNICATION SPEED

The data communication speed is measured in a unit called **baud.** In general baud is same as number of bits transmitted per second. However technically baud refers to the number of signal changes per second.

BANDWIDTH

The amount of data that can be carried from one point to another in a given time period (usually in a second) through some medium is called Bandwidth. It is usually expressed in bits per second (bps). OR we can say that it is the capacity of data a medium can carry in a given time. The wider the bandwidth of a communication system, the more data it can transmit per second. Narrow bandwidth allows a limited data transmission rate whereas wider bandwidth allows more rapid flow of information. There are three main bands available for the transmission of data.

i) LOW SPEED OR NARROW BAND

Low speed or narrow band provides a communication speed of 40 to 300 bauds (40-300 bits per second). In this category telegraph communication lines are included.

ii) MEDIUM SPEED OR VOICE BAND

Medium speed lines operate at rates varying from 300 baud to 56,000 baud. This speed range is accommodated by lines, which are used for ordinary voice communication hence the term "voice band" is used to describe these lines. The most commonly used media for this speed is telephone line.

iii) HIGH SPEED OR BROADBAND

High-speed communication lines, commonly called broadband or wideband, permit transmission rates over 56,000 baud. High-speed channels require microwave, fiber optics or satellites transmission. Broadband is used when a large volume of data is to be transmitted at high speed.

FACTORS AFFECTING COMMUNICATION

- **EMI (Electromagnetic Interference)**

EMI affects the signal that is sent through transmission media. It is caused by outside electromagnetic waves affecting desired signal, making it more difficult for the receiving computer to recognize the correct signal. EMI is also referred to as a **noise.**

- **ATTENUATION**

The weakening or degrading of a transmitted signal as it travels through the transmission medium farther from its point of origin is known as attenuation.

NETWORK HARDWARE / DEVICES NEEDED FOR NETWORKING / INTERNETWORKING / DATA COMMUNICAITON.

- **REPEATER / AMPLIFIER**

All transmission media attenuate (weaken) the signal that travels through them. Repeaters Or Amplifiers are used to strengthen the attenuated signal and pass it on to the medium. The difference between repeater and amplifier is that **Amplifier** doesn't filter the noise form the signal and pass the signal along with the noise where as an **Repeater** filters the signal removing the noise from it.

- **ROUTER**

Router is a device that mostly used to connect dissimilar networks but it can be used to connect similar networks as well. The main responsibility of a router is to forward data over networks choosing the best available path using the routing information in its routing table.

- ## BRIDGE

Bridge is a device that connects two LANs or two segments (parts) of a same LAN that uses same standard / protocols such as Ethernet or Token ring. In other words it connects two similar networks and controls data flow between them.

- ## GATEWAY

Gateway is a device that connects two networks working on different protocols / platforms. Gateway can be a computer, router, switch etc. In other words we can say that a Gateway is a node that serves as an entrance to another network.

- ## NIC (Network Interface Card) / Network Adapter Card

Network Adapter card works as a physical connection between the computer and the network cable on a LAN. It provides a facility to control the exchange of data between computers connected in a network. In addition the Network Adapter also has to indicate its location or address to rest of the network to distinguish it from all of the other cards on the network. Each

computer in a LAN must be equipped with a Network Adaptor, hence each computer on a network has a unique address called MAC address. The data transmission speed of an Ethernet card is from 10 Mbps to 1000 Mbps.
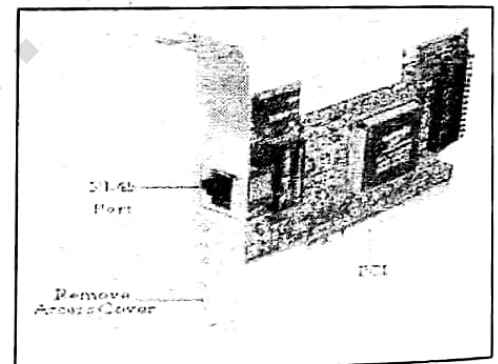
- ## MODEM

Modem stands for MODulator and DEModulator. It is a device that convert digital data (0,1) to analog signal(sine waves) and again from analog signals to digital data.

MODULATION AND DEMODULATION

Modulation is the process of converting digital data to analog signals so that they can be transmitted over the transmission line (telephone line) OR Transferring a sequence of 1s and 0s by vary the amplitude, frequency or phase is called **Modulation**. **Demodulation** is the process of converting analog signals to digital data (0,1).

Explanation

As we know that inside the computer the data is represented in binary format (i.e in the form of 0s & 1s). This data is also referred to as digital data. On the communication lines, this data is not able to travel because only analog signals can travel on the communication line. So, it is necessary to first convert the digital data to analog signals (At source site) and again to convert the analog signals to digital data (at destination site). So it is obvious that before the data is transmitted from one point to other, it has to go through the process of modulation and demodulation.

```
┌──────────┐  01101  ┌───────┐   ╭╮╭╮╭╮   ┌───────┐  01101  ┌────────────┐
│ Source   │─────────│ MODEM │──╱  ╲ ╲ ╲─│ MODEM │─────────│ Destination│
│ Computer │         │       │           │       │         │ Computer   │
└──────────┘         └───────┘           └───────┘         └────────────┘
                         ↓                   ↓
                    Modulation          Demodulation
```
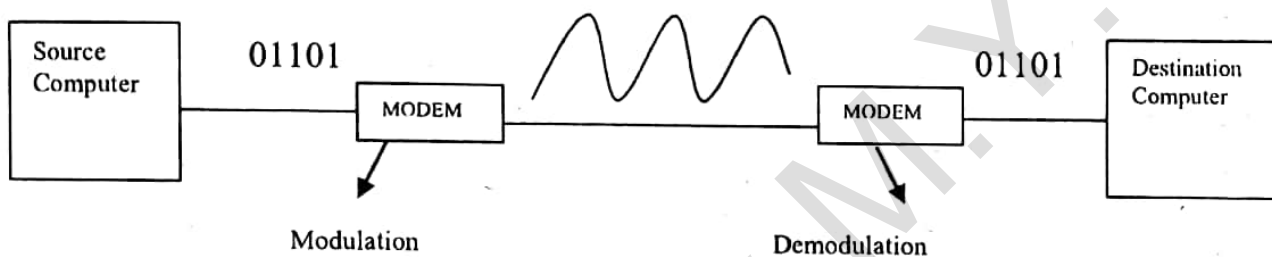
TYPES OF MODULATION: There are three types of modulation as follows:

1) Amplitude Modulation (AM)   2) Frequency Modulation (FM)
3) Phase Modulation (PM)

During the process of modulation the sequence of 1s and 0s are transferred by varying amplitude, frequency, or phase of the carrier wave.

Carrier Wave:

It is a wave that carries data from one point to the other during data transmission

1- AMPLITUDE MODULATION

It is a type of modulation in which the amplitude (strength of signal wave or height) of carrier wave is changed according to the input data (modulating signal), keeping the frequency and the phase of the carrier wave constant. Normally 1 (high voltage) is represented by larger of amplitude and 0 (low voltage) is represented by smaller amplitude. It is also known as ASK (Amplitude Shift Keying).
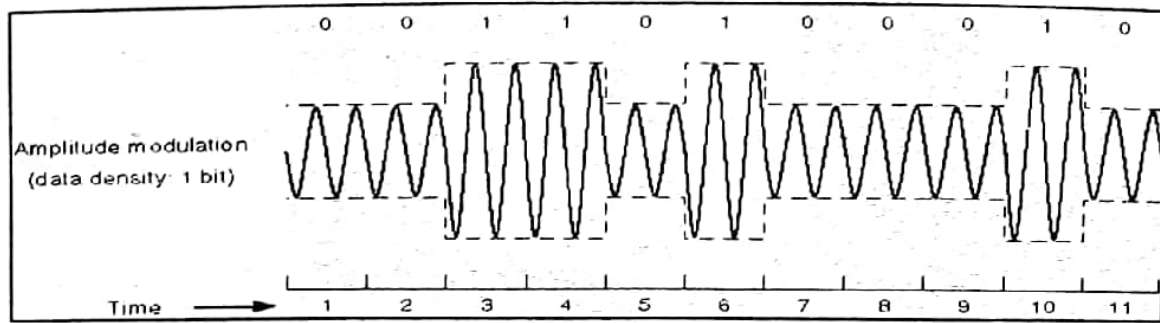
2- FREQUENCY MODULATION

It is a type of modulation in which the frequency (no of cycles per unit time) of carrier wave is changed according to the input data (modulating signal), keeping the amplitude and the phase constant. Normally 1 (high voltage) is represented by more number of cycles and 0 (low voltage) is represented by less number of cycles. It is also known as FSK (Frequency Shift Keying).
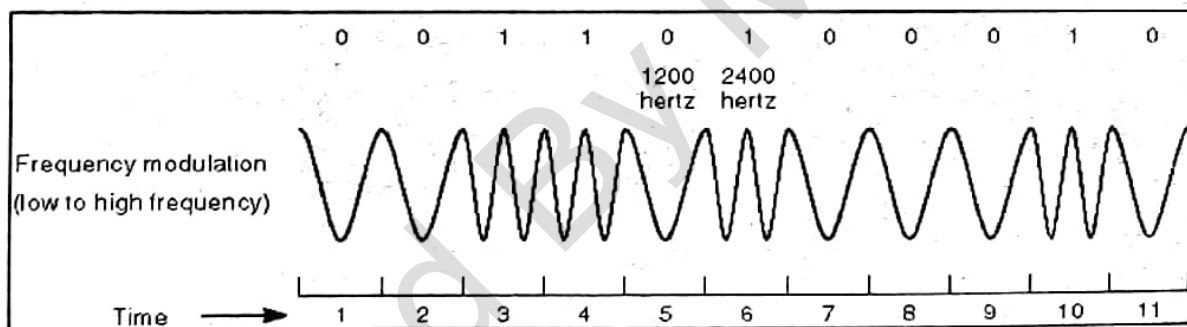

3- PHASE MODULATION

It is a type of modulation in which the phase of carrier wave is changed according to the input data (modulating signal), keeping the amplitude and frequency constant. Both 1(high voltage) and 0 (low voltage) are used for phase shift. It is also known as PSK (Phase Shift Keying).
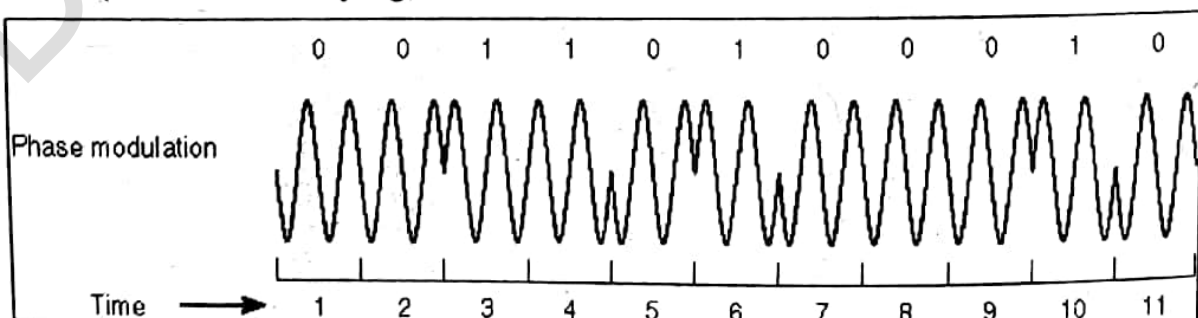
ENCODING

Data come in both analog (continuous) and digital (discrete) form. For transmission, input data must be encoded as a signal that matches the characteristics of the transmission medium. Both analog and digital data can be represented as analog and digital signals. Modulation is the process of encoding source data on to a carrier signal. There are four possible encoding combinations.

    i-   Digital data, Digital Signal   ii-   Analog data , Digital Signal

    iii-   Digital data, Analog Signal   iv-   Analog data, Analog Signal

Modem uses two different methods for transmitting characters as follows:

1- ASYNCHRONOUS TRANSMISSION

Modems that are used with simple dialup telephone connections uses Asynchronous transmission.

In Asynchronous transmission the characters are transmitted in discrete /

ASYNCHRONOUS MODE
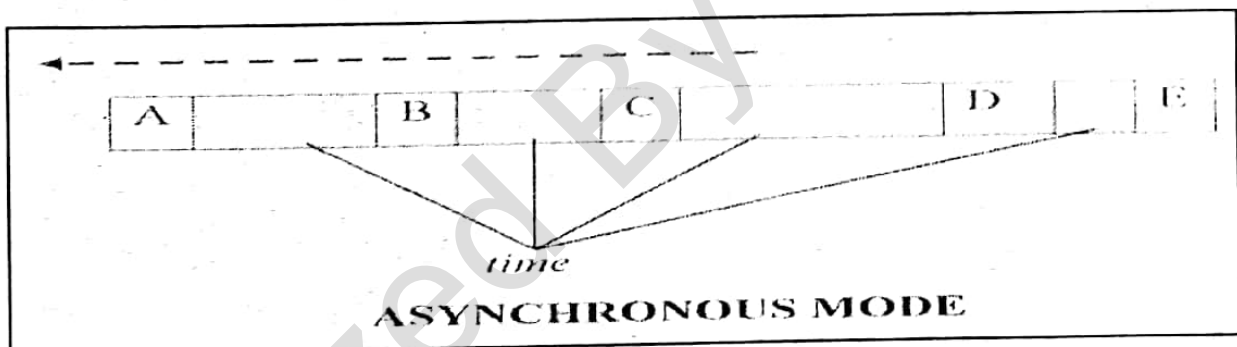
irregular manner and the time interval between the two characters is not fixed. As the data is transmitted in the irregular manner so at the receiving end, it causes a lot of problem to recognize the start and end of the character. In order to overcome this short coming two bits are included in every character that represent the start and the end of character. Usually, the start bit is represented by "1" while the stop (end) bit is represented by a "0". The data transmission speed in asynchronous mode is slower due to the extra bits involved in the data transmission and the gaps (time delay) between the characters.

2- SYNCHRONOUS TRANSMISSION

Modems that are used with dedicated connections (DSL, ISDN) uses Synchronous transmission.

In synchronous transmission the data is transmitted character by character in
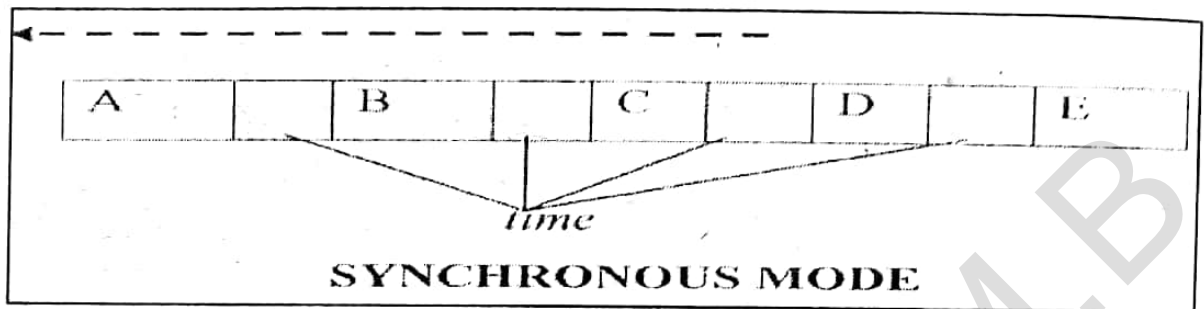
SYNCHRONOUS MODE

such a way that the distance (time delay) between every two characters is constant. It is obvious that in synchronous mode the (time delay) between every two character is constant so there is no need of including start and stop bits with each character. As a result, the size of data is decreased and the transmission speed becomes high. However a special idle signal is sent when there is no data to transmit. In this type of transmission some kind of clocking mechanism is also placed to keep the clocks of transmitter and receiver synchronized.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) The transfer of data from one location to another is known as_____.
2) Time intervals between two characters in not fixed in _____ transmission.
3) _____ describes the data communication capacity of a communication system.
4) A _____ line can send and receive data in both directions but not simultaneously.
5) _____is the process of converting digital data to analog signals

Answer

1) Data Communication	2) Asynchronous	3) Bandwidth	4) Half duplex	5) Modulation

Q1b) Tick the correct option.

1) The capacity of data communication system is called _____
   A- Bandwidth   B- weightage   C- Capacity   D- Baud
2) A communication technique to transmit large volume of data over long distance is called____
   A- Baseband   B- Broadband   C- Bandwidth   D-None
3) Which communication medium requires line of sight.
   A- Microwave   B- Fiber optics   C- Twisted pair   D- Coaxial
4) Which of the following is a component of LAN?
   A- Cable   B- NIC   C- Bridge   D- All of these
5) The data Communication Speed is measured in a unit called_____
   A- Band   B- Baud   C- Bit   D-Byte

Answer

1) A	2) B	3) A	4) D	5) A

CHAPTER 4
USES OF COMPUTER

USES OF COMPUTER IN DAILY LIFE / IN DIFFERENT FIELDS

Nowadays, Computer is being used in daily life and widely in a number of fields. Some of them are discussed below:

USES OF COMPUTER IN HOME

The invention of personal computer by Intel Corporation made it easy to use the computer for almost every person. In homes the computer can be used to keep track of the monthly budget and expenditures. The computer can also used for entertainment purpose, it can be used either watching movies using DVDs or listen to music using CD-ROMs.

USES OF COMPUTER IN EDUCATION

Computers are being used as an essential component in the field of education from primary to university level. A number of informative software has been developed to facilitate the students in their studies relating different subjects.

Computer-Based Training (CBT) is playing an important role in the field of education. CBT are different program that are supplied on CD-ROM. These CD-ROM contains audio or video lectures about a particular subject.

Online libraries have also brought the revolutionary change in the field of computer-based education. By using computers with the networks, the barrier of distance has been eliminated and one can access a book from an online library situated in any part of the world through the web.

The culture of online examination is also developing day by day. Online examinations are conducted on computer networks where the examiner and students are far away from each other. Such examinations guarantee the speed, accuracy and reliability e.g. MCSE (Microsoft Certified System Engineer), MCSD (Microsoft Certified System Developer) and OCP (Oracle Certified Professional) examinations are conducted throughout the world on web.

USES OF COMPUTER IN E-COMMERCE

Business transactions (sales and purchases) taking place on the web are termed as E-Commerce. The essential components of E-Commerce are just a computer based network and an appropriate website describing the organizations and its entity (production) available for sale. The website is uploaded on the web and is accessible globally. It is an excellent way of advertisement at very low cost. The orders are received through the website and payments are made through credit cards, the delivery is either made through the web (if the item is software) or through a courier service (if the sold item is physical)

Banks, airline, stock exchange and multinational organizations are using this technology from the last few years and their results are very encouraging e.g. in 1999, almost half of the total sales of Intel-corporation were made through the web and now the Intel corporation is planning to shift all its transactions on the web. Since the web/e-commerce provides security, reliability, accuracy and speed on minimal cost.

USES OF COMPUTER IN E-BANKING

E-banking is electronic banking means the banking transactions taking place through networks. In this type of banking, all the records are maintained on computers. These computers are firstly linked with each other through a special system of network. Then secondly, they are linked with Internet.

Banks that deals in e-banking provides facility of online shopping, using its deposit accounts and credit cards that are also known as plastic money. E-banking is accurate and speedy because computer does all the accounting and bookkeeping, thus very rare chance of error remains there. Few of Pakistani banks have also converted their system on this method.

ATM (Automated Teller Machine) is the most advanced form of e-banking used for the withdrawal of money. An ATM system requires an ATM card having a specific PIN code. ATM provides the facility of instant cash 24 hours a day with the lating of corresponding accounts automatically.

The only disadvantage of e-banking is the lack of security. PIN code of a specific account holder may be hacked since all the records are online.

USES OF COMPUTER IN MEDICAL

Now a day, computer is being used widely in medical field in various ways:

i) Maintaining Records of Hospital

In hospitals, the record of patients, doctors, medicines and laboratory tests are maintained through special purpose application software known as Database Management Systems. This software is able to produce monthly reports based on different criteria. These reports are then used to identify and remove the flaws of the system.

ii) By using Expert System

Now a day, computers are also being used as an expert system in medical field. An expert system is one that behaves like an expert of the corresponding field. These are special computers and software that are used to identify the disease and suggest a proper treatment on the basis of symptoms. MYCIN is the best example of such expert systems publically used in Europe for the said purpose.

iii) Patient Monitoring Instruments

In Intensive Care Units, computers are used to monitor instruments which record important data about the patient. If the data moves outside a certain limit, an alarm is sounded so that immediate medical help can be sought. The measurements constantly taken by the computer would include blood pressure, pulse rate, heart wave shape from ECG(EelectroCardioGram) etc, that information needed to be taken so regularly that a nurse was needed for each patient. Now one nurse can look after many patients.

iv) Diagnosis of Diseases

Computers can be used to locate tumors at an early stage. Body scanners are used which send rays into the human body. After passing into the human body the rays are picked up by a detector. Signals from the detector are analyzed by the computer

and are converted to a digital form which can be displayed as a picture on a television screen. On the screen the tumor appears as a dark spot.

WORD PROCESSOR

Computer based word processors have replaced the conventional typewriter in an excellent manner due to their versatility. Computer based word processors are far much better than the conventional typewriter due to the following reasons:

1- A typewriter is capable of providing a document in plain text while a computer based word processors provides a document with multiple fonts, styles and colors.

2- Computer based word processor provide the facility to the user to insert images or pictures in a text document however; this is beyond the power of typewriter.

3- There is no chance of error correction in typewriter while a computer based word processors provides the facility of error detection and correction and formatting the document before the printing takes place

4- Computer based word processors are capable of storing a document so that it can be used again and again while a typewriter does not provide such a facility.

USES OF COMPUTER IN CAD

CAD stands for Computer Aided Designing. It is the use of computers in designing. Usually the designs of various electrical and mechanical devices are prepared by the computer i.e CAD helps in designing cars, planes, ships and machinery's models. The models designed by the computers can be tested by the computer as well so they are more reliable an accurate. The use of CAD is also popular in textile engineering, architecture and in different industries.

USES OF COMPUTER IN CAM

CAM stands for Computer Aided Manufacturing. It is the use of computers in the manufacturing of a product. Computers, not only assures the product quality through CAM but it also manufactures a product in very little time. The products

manufactured using CAM is more reliable than manually made products especially where accuracy and sensitivity of the product are the main issues.

USES OF COMPUTER IN CIM

CIM stands for Computer Integrated Manufacturing. CAD and CAM are jointly called CIM. So CIM can be defined as an integrated system of manufacturing a product that also supports designing.

USES OF COMPUTER IN RETAILERS / WHOLE SELLERS

Now a day, computer is being used in departmental stores, supermarkets. It is also being used by the retailers to optimize the work. Almost all products of daily use are now manufactured with the bar code called **Universal Product Code (UPC)**. The computer is also used there to keep the record of sales, purchases and stock. The main duties of such software are not only to keep the record of every transaction but also to provide daily, weekly, monthly or yearly reports based on different criteria. These reports are very much faster, accurate and reliable compared with manual ones.

USES OF COMPUTER IN COMPUTER SIMULATION

Creating an artificial environment approaching to the real one is called simulation. A Computer Simulation uses a mathematical model of a real system in the form of computer program. Computer is capable of creating such an environment, which looks like a real one by using special software. e.g different games have been developed which reflect the real environment like in a car racing game, the cars, the tracks look like the real ones.

Besides games, computer simulation technology is also being used in the field of science and technology especially in nuclear research. Now, there is no need of having atomic explosion for testing purposes. By using computers, this task can be carried out using simulation and without undergoing an atomic explosion. Such a test is very much reliable and accurate and is known as "Cold test".

Simulation of river systems can be manipulated to determine the potential effect of dams and irrigation networks before any actual construction has taken place.

Now a days, hardware based computer simulation is also becoming popular. Such a simulation involves computer hardware in the environment e.g. in a car races whenever the car hits an object (another car, pole, bridge) a jerk is felt on the hands through joysticks that is controlling the movement of the car.

USES OF COMPUTER IN COMPUTER GRAPHICS

Computer graphics refer to images or animated pictures displayed on a video display unit or printed on a printer. Computer graphics is playing an important role in different field of life e.g. in the field of textile engineering computer graphics are being used to create and produce beautiful designs of clothes. In the field of engineering it is being used to design the models and architectural maps of buildings, bridges and roads. In the field of science & technology computer graphics is being used for the designing of microchips and other electrical equipments. Computer graphics is very popular in entertainment industry, which uses them to create the animation of video games, advertisements and special effects in motion pictures.

USES OF COMPUTER IN WEATHER FORECASTING

Computers are very useful in modern weather forecasting as they produce more accurate results than in the past. Large amount of Physical data such as air pressure, humidity, temperature, and wind speed etc are collected to produce accurate weather forecast. The data is collected from weather stations, weather ships, aircrafts, airports and satellites that are situated all around the world. To produce an accurate weather forecast, special computers are required. Weather reports are stored on the computer, which makes it possible to find out whether the weather situation was the same in previous years. This information can be used to predict weather trends.

SOLVED EXERCISE

Q1a) Fill in the blanks
1) CAD stands for _____.
2) CBT stands for_____.
3) Creating an artificial environment approaching to the real one is called _____.
4) An ATM system requires an ATM card having a specific _____ code.
5) The use of computers in the manufacturing of a product is known as_____.

Answer

1) Computer Aided Design	2) Computer Based Training	3) Simulation	4) PIN	5) CAM

Q1b) Tick the correct option.
1) E-banking is _____ banking means the banking transactions taking place through networks.
  A- Electronic   B- Electric   C- Electron   D- All
2) E-commerce stands for?
  A- Enhanced Commerce   B- Electrical Commerce   C- Electronic Commerce D-None
3) A mathematical description of a real system in the form of computer program is called____
  A- Printer   B- Microwave   C- Simulation   D-None
4) In _____, computers are used to monitor instruments which record important data about the patient
  A- CIUs   B- UICs   C- IUCs   D- ICUs
5) Maintaining business relationships and selling commodities by means of network is known as _____
  A- E-commerce   B- Simulation C- Emulation   D-CAD

1) A	2) C	3) C	4) D	5) A

CHAPTER 5
COMPUTER ARCHITECTURE

COMPUTER LANGUAGES

Computer Languages are used to develop software. They provide a facility to write a programming code in a software development process. Following are the main programming languages.

1- Machine Language 2- Low-level Language 3- High Level Language

1- MACHINE LANGUAGE

Machine Language is a fundamental language of computer that consist of a set of instructions that is written in binary codes i.e. (0,1). The computer directly understands machine language without using any translation program.

The main advantage of machine language is that it is very fast in execution because its instructions are directly understandable by the computer. However, it has some limitations and disadvantages for example a program written in machine language is machine dependent i.e a program written in one computer cannot be run to another computer (with respect to its internal design of computer). Second disadvantage is that it is very difficult to write and understand the code of machine language.

MACHINE INSTRUCTION

Any instruction of machine language has two parts

 i- OpCode (Operation Code) ii- Operand

i) OPCode OP-Code stands for Operation Code. It is a set of usually three bits that represents specific operation performed on the operand. Combination of these operations is known as instruction set. Every computer has its own instruction set and the number of bits for Opcodes may vary from computer to computer.

ii) Operand Operand means the data that is used for a specific operation represented by Opcode. For example for the instruction Add 2, 4, Add is the operation while 2 and 4 are operands.

2- LOW –LEVEL LANGUAGE (ASSEMBLY LANGUAGE)

The low level language (Assembly Language) was developed to replace machine codes by set of symbols, which are more meaningful as compared to machine codes and could easily be handled by the programmer. Set of symbols used in assembly language is known as mnemonic codes. e.g SUB is used for subtract etc. Assembly language varies from computer to computer (with respect to internal design of computer.

Advantages of low-level language

1- Low-level language instructions are easy to write as compare to machine language.

2- The use of mnemonic codes makes it easy to understand and modify.

3- The execution of a low-level language program is very fast because assembly language instruction has a one-one correspondence to machine language.

4- We can control hardware components through assembly language instructions.

Disadvantage of low-level language

1- The program of Assembly language is machine dependent

2- To control hardware of a computer thorough knowledge is required to do so.

3- The code of assembly language is very lengthy and complex to write.

3- HIGH–LEVEL LANGUAGE

High-level languages enable a programmer to write instructions using natural language (English language) and familiar mathematical symbols instead of using mnemonic codes, so it becomes easier for a programmer to write codes using high-level languages. The high-level languages are used in application programming rather than developing system software. Pascal, BASIC (Beginners All Purpose Symbolic Instruction Codes), COBOL (COmmon Business Oriented Language), and FOTRAN (FOrmula TRANslation) are some of the examples of high-level languages.

Advantages of high-level language

1- High-level languages are closer to human languages so this makes it easy to learn.

2- One statement in High level language is equal to multiple statements of machine language therefore the program written in HLL is smaller than program written in low-level language.

3- The program written in HLL is a machine independent program i.e the program can be easily transferred and run to one computer to another.

Disadvantages of High Level Language

1- We can not develop system software using high level language.

2- We can not control hardware component through high level language

3- Limited to the development of programs that solve the particular problems of user.

LANGUAGE TRANSLATORS / PROCESSORS

A program written by a programmer in Assembly language or any high level language is called a source program, which is not directly understandable by the computer. Language translators are used to convert the source code into machine code and make a computer capable to understand the instructions so language translators can be categories as system software. There are three types of Language translators as:　i- Assembler　　ii- Compiler　　iii- Interpreter

i) ASSEMBLER

Assembler is a language translator that lies in a category of system software. It is used to translate assembly language instructions into machine codes. TASM and MASM are the example of assembler.

ii) COMPILER

A compiler is a high-level language translator program. It translates a whole high level language program at once into machine language before the execution and generates the object file if there is no error in the source code. The compiler

translates source code and keeps record of syntax error and displays error list at the end of compilation if there is any error in the program. The object code (machine code) then can be converted into executable form with the help of a linker. Compiler is used in C-language as a language translator.

iii) INTERPRETER

Interpreter is a high-level language translator program that translates a high-level language program into machine code one line at a time. Each line is executed after it is translated it does not create an object code file. Interpreters are comparatively slower than compilers because each line is translated every time the program is to be run. Interpreter is used in BASIC language as a language translator.

BASIC OPERATIONS PERFORMED BY COMPUTER SYSTEMS OR THE INFORMATION PROCESSING CYCLE

The information processing cycle is a set of steps the computer follows to receive data, process the data, give the information and store when required. The steps of Information processing cycle or the basic steps performed by the computer are as follows:

1- Input Operation

Computer can accept data (raw material) by means of devices such as keyboard, mouse etc known as input devices.

2- Processing Operation

Computer processes the accepted data based on instructions from user or program to generate results by using devices such as CPU.

3- Output Operation

After processing the accepted data, computer produces useful information / result by means of devices such as monitor, printer etc.

4- Storage Operation

Computer can store the results of processed operations for future use on devices like hard disk, floppy disk etc known as storage devices.

5- Controlling Operation

Computer directs and controls the sequence and manners of all operations i.e. input, process, output, and storage operations.

COMPUTER ARCHITECTURE

The connections between the internal devices of computer and the functions of these devices are said to be architecture of a computer.

The internal architectural design of computers differs from one system model to another. **Large Scale Integration (LSI) and Very-Large Scale Integration (VLSI)** technologies made it possible to put tens of thousands of transistors on a single chip called a microprocessor. A block diagram of basic computer architecture is shown below. In the figure the solid lines are used to indicate the flow of instruction and data and the dotted lines represent the control exercised by the control unit.
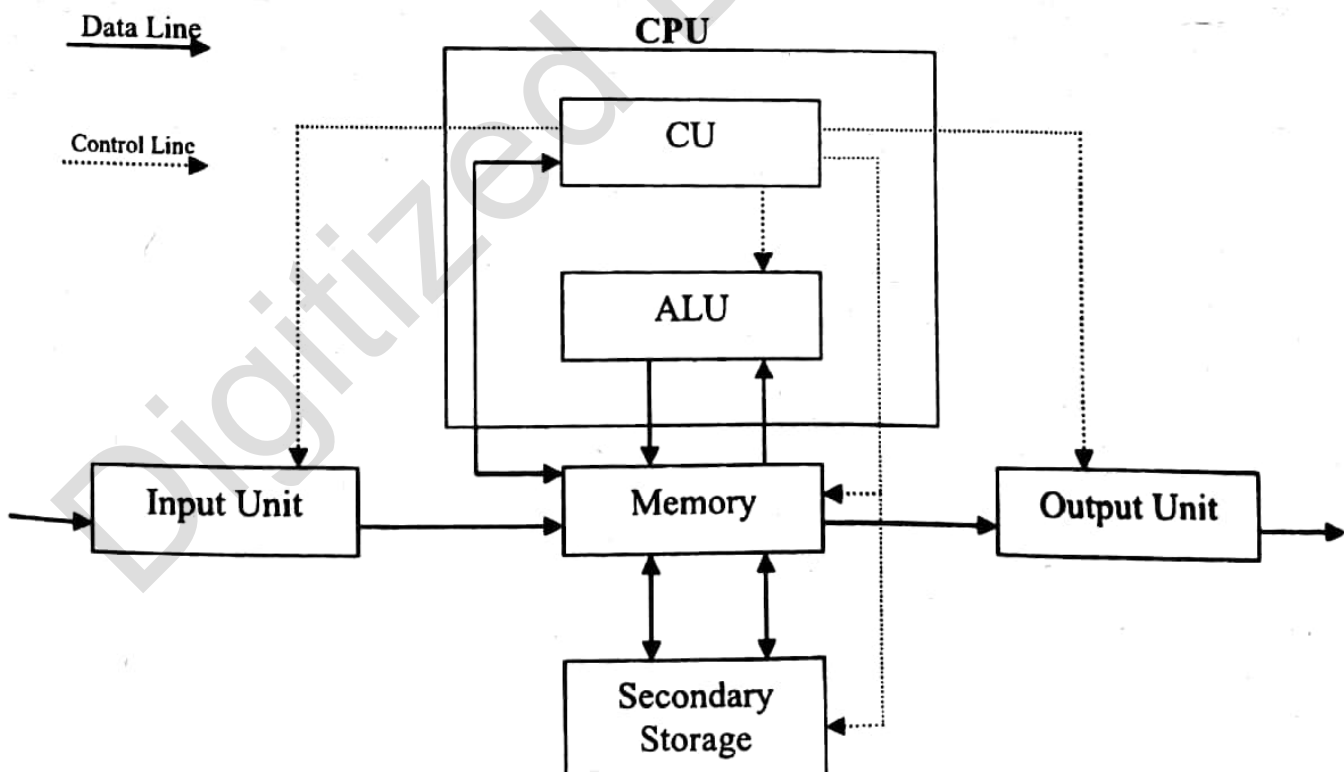
Block Diagram of a computer.

CPU (Central Processing Unit) / MICROPROCESSOR

The CPU is also called microprocessor. It is the brain of a computer system. As in a human body, the brain takes all major decisions and other parts of body function as directed by the brain. Similarly, in a computer system, all major calculations and comparisons are made inside the CPU and it is also responsible for activation and controlling the operations of other units of a computer system. It consists of CU and ALU, apart of CU and ALU it also contains Registers and L1 Cache memory.

CU (Control Unit)

Control Unit is the part of CPU which works like a traffic cop in a computer system. It directs and coordinates all the operations of the entire computer system. It controls ALU, all the memory devices, and all the input/output devices. The main function of CU is to perform machine cycle i.e to fetch, decode and execute the instructions that are in memory.

ALU

Arithmetic Logic Unit is the part of CPU that performs the arithmetic operations like addition, subtraction, multiplication etc and logical operations like AND,OR,NOT , <,>,>=,<=, = etc. It consists of complex logic circuits such as adders, subtractors and comparators etc. Its operation is controlled by Control Unit.

CO-PROCESSOR

A Co-processor is a special additional processing unit that helps the main CPU in performing certain types of operations for example a **Math Coprocessor** is used to perform complex mathematical calculations specially floating point operations therefore math coprocessor is also known as Floating Point Unit (FPU). In addition to math coprocessor there is also **Graphic Coprocessor** that is designed for handling graphics computations.

STORAGE UNIT

The storage units of computer system are designed to store the data or instructions either temporarily for a short period of time or permanently for future uses.

MEMORY OPERATIONS

Each type of memory is different in its internal operations but the basic operations are performed are same for all memory devices that are:

- **Read operation**

The read operation is often called fetch operation that is the action used to read the data or instruction (memory word) from specific memory location (address) and transferred to another location may be in some register.

- **Write operation**

This is the operation that is used to place a data (new word) into a particular memory location. It is also referred to as store operation. Whenever a new word is written into a memory location, if there is any other word already stored then it replaces the word that previously stored there.

TERMINOLOGIES OF MEMORY

- **Access Time**

Access time is the amount of time required to locate and retrieve stored data or the time to perform read operation. The speed of memory devices can be measured by access time. Normally Sequential Access Memories like magnetic tapes have much longer access time than Random Access Memories like Magnetic disks and RAM.

- **Storage Capacity**

It is the amount of data that can be stored in the storage Hardware. The basic unit of storage capacity is byte. Now a day we have large capacity storage mediums like Hard Disk, DVDs Blue Ray Disc etc.

- **Cycle time**

The amount of time required for performing read or write operation and then return to its original state is called cycle time i.e total time required to perform machine cycle (fetch, decode, execute). The cycle time is longer that access time.

STORAGE / MEMORY is basically of two types as follows:

- **Primary Storage / Internal Storage / Short Term Memory**

Primary storage units have faster access time, smaller storage capacity and higher cost. One of the main examples of primary storage device is RAM.

- **Secondary Storage / Auxiliary Memory / Long Term Memory**

Secondary Storage or auxiliary memory is used to store large amount of data on permanent basis, which can be partially transferred to the primary storage when required. One of the main examples of Secondary storage device is Hard Disk.

STORAGE CAPACITY MEASUREMENTS / BASIC UNITS OF DATA STORAGE AND MEMORY

1 nibble	=		4 bits
8 bits	=		1 byte (Basic Unit)
1024 bytes	=	2^{10}	= 1 Kilo Byte
1024 KB	=	2^{20}	= 1 Mega Byte
1024 MB	=	2^{30}	= 1 Gega Byte
1024 GB	=	2^{40}	= 1 Tera Byte

STORAGE LOCATIONS AND ADDRESSES

Primary or internal storage is made up of small storage areas called **Cells**. One bit is stored in a cell, and a group of bits is known as a **word**. **Word size** refers number of bits a computer can process at a time. Each location of a word has a unique number assigned to it. This number is called the address of that location or word. Each location can hold a data item or an instruction.

Memory Location (Addresses)

| Address	Word
000	Word 0
001	Word 1
010	Word 2
011	Word 3
100	Word 4
101	Word 5
110	Word 6
111	Word 7

Inside the computer the address are represented in binary numbers. However we can use the addresses in octal, hexadecimal and decimal numbers for our convenience.

TYPES OF MAIN MEMORY

1- RAM   2- ROM

1- RAM (Random Access Memory)

The word Random implies that any location can be randomly (directly) selected and used to store and retrieve data or instruction. It is a semi-conductor memory and also referred to as a **READ/WRITE memory.** RAM is used in a computer for storage of active programs and data. Large RAM size provides larger amount of information to a computer for processing and therefore increased the processing speed. The major disadvantage of RAM is that it is **volatile** in nature and therefore loses all stored information if the power is turned off. There are two types of RAM.
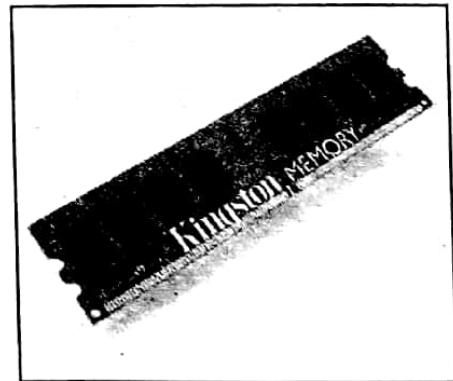
- **DRAM**

DRAM stands for Dynamic Random Access Memory. DRAM must be recharge many times each second because it will lose its contents if it is not refreshed or recharged.

- **SRAM**

SRAM stands for Static Random Access Memory. It is considerably faster than DRAM because it doesn't need to be recharged to hold its contents.

2- ROM

ROM stands for Read Only Memory. This type of semiconductor memory is a **non-volatile** memory that is designed to hold information that is either permanent or will not change frequently. During normal operations, no new data can be written into a ROM, but data can be read from the ROM. The programs or instructions written on the ROM are called **firmware**, which is usually done in the factory during manufacturing. The instructions in ROM are used for booting the computer and performing the **POST** (Power On Self Test) action.

TYPES OF ROM

- **PROM (Programmable Read Only Memory)**

A PROM is a semiconductor chip that is obtained from the manufacturer in an un-programmed state and the user programs it according to his desire. A commercially available machine called **prom programmers** are used to program it. However once the chip has been programmed the recorded information cannot be changed. PROM is also a non-volatile memory.

- **EPROM (Erasable Programmable Read Only Memory)**

Once the information stored in a ROM chip or PROM chip, it cannot be erased and modified. EPROM overcomes this problem and makes it possible to erase information stored in it and the chip can be reprogrammed to store new information. Exposing the chip for sometimes to ultraviolet light erases information stored in an EPROM chip.

• **EEPROM**

EEPROM stands for Electrically Erasable Programmable Read Only Memory. As the name implies the contents of EEPROM can electrically be erased and re-programmed. It works like a **READ/WRITE** semiconductor memory while having the nonvolatile nature.

Difference between ROM and RAM

ROM	RAM
1) It is a Read Only Memory.	It is a Read Write Memory.
2) It is a permanent memory.	It is a temporary memory.
3) Only the manufacturer of the ROM can write instructions into it at its manufacturing time.	The user can read and write data and instructions into it at any time while the computer is running.
4) It has a small storage capacity.	It has a large storage capacity.
5) It is a non-volatile memory.	It is a volatile memory.

Difference between RANDOM ACCESS MEMORY and SEQUENTIAL ACCESS MEMORY

Sequential Access Memory	Random Access Memory
1) It reads/write data in sequence.	It reads/writes data randomly/directly into any location of memory.
2) Its' access time is longer.	Its' access time is shorter
3) Due to longer access time its storage/access mechanism is slow.	Due to shorter access time its storage/access mechanism is fast
4) Magnetic tape is an example of Sequential Access Memory.	Semiconductor memories like magnetic disk and RAM are examples of Random Access Memory.
5) It is cheap in price.	It is expensive in price.

FLASH MEMORY

Flash Memory is a special type of memory, which is becoming very popular now a day. The data can be READ and WRITE and due to its non-volatile nature, flash memory doesn't lose its contents when the power is turned off. We can say that, it combines the READ/WRITE feature of RAM and non-volatility of ROM. Flash memory is usually used in digital cameras, cool disks etc.

CACHE MEMORY

Since the processing speed of a processor is greater than the access time of RAM so, the processing capabilities of processor are wasted in just waiting for the data. In order to overcome this problem a very fast memory is introduced between RAM and the processor. This memory is called cache memory. Cache memory is very expensive and small in size. It takes data from RAM and provides to the processor. Its contents get erased when the power is turned off due to its volatile nature. Now a days several types of Cache memory available as

- L1(Level 1) Cache inside the CPU.
- L2(Level 2) Cache on the motherboard.

USE OF REGISTERS IN COMPUTER

Registers are the extremely fast temporary storage devices inside the CPU used to store data, instructions and memory addresses before, during and after some operation as directed by the CU. The size of the register can be of 16 bits to 64 bits. Some of the most common registers are as under:

1- PC

PC stands for Program Counter. This register stores the address of next instruction to be executed. It works as a counter that controls the sequence in which the instructions are fetched from memory. The PC is incremented when the content (address) is transferred to MAR. It always holds instruction addresses that refer to the program portion of memory.

2- MAR

MAR stands for Memory Address Register. This register holds the address of memory where CPU wants to read or write data. When CPU reads (fetches) the instruction from the memory, its address is loaded into Memory Address Register. Similarly when CPU writes (stores) the data into memory its address is transferred to MAR.

3- MBR

MBR stands for Memory Buffer Register. This register holds the contents of data or instruction read from or written into memory. When CPU reads instruction from the memory address provided by Memory Address Register, it transfers the contents to Memory Buffer Register. Similarly when CPU writes (store) data into memory the contents of MBR are stored to the memory.

4- IR

IR stands for Instruction Register. It is also called CIR(Current Instruction Register). This register holds the instruction that is to be processed or being processed by the processor. The instruction decoder unit of microprocessor decodes the instruction hold in IR by analyzing the OpCode of the instruction.

5-Accumulator and Data Register (DR)

These two registers hold the operands that are loaded from memory. The ALU operates on these registers during the execution of instruction. They both can also used to store the intermediate result of arithmetic operation but the final result will always be stored in the Accumulator register.

6- DAR

DAR stands for Data Address Register. During the execution of a store the accumulator instruction, the DAR will hold the operand address corresponding to the memory location where the content of the Accumulator is to be stored. It always holds data addresses that refer to the data portion of memory.

PROCESSING MACHINE INSTRUCTION / MACHINE CYCLE

Each time the Control Unit executes the machine instruction, it takes a series of steps. The complete series of steps is called a Machine Cycle. The steps of machine cycle are as under:

i) Fetch

Before the CPU can execute an instruction, the Control Unit must bring the instruction from computer memory to CPU, so reading instruction from memory and transferring it to CPU is called fetching.

ii) Decode

The process of translating the instruction so that the computer can understand it, is called decoding instruction. CPU decodes the instruction by analyzing the OpCode of the instruction.

iii) Execute

The process of taking action on the decoded instruction is called execution.

iv) Store

After executing the instruction the CPU may be required to store the result of an instruction in memory. (This condition is not always required).

MICRO OPERATION

To execute a single machine instruction the control unit performs series of small operations. These operations are known as micro-operation. Various registers are used in micro-operations.

DETAILED DESCRIPTION OF FETCH-DECODE-EXECUTE CYCLE

To better understand what is going on at each stage we'll now look at micro-operation performed by CU during Fetch-Decode-Execute Cycle

(The very first instruction 'LOAD 206' will load the value 1 to accumulator registers)

1- The contents of the Program Counter (the address of the next instruction to be executed) is placed into the Memory Address Register
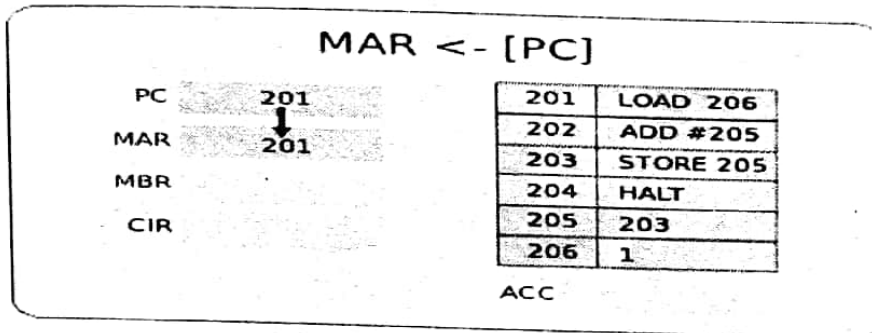
2- The address is sent from the MAR along the address bus to the Main Memory. The instruction at that address is found and returned along the data bus to the Memory Buffer Register. At the same time the contents of the Program Counter is incremented.
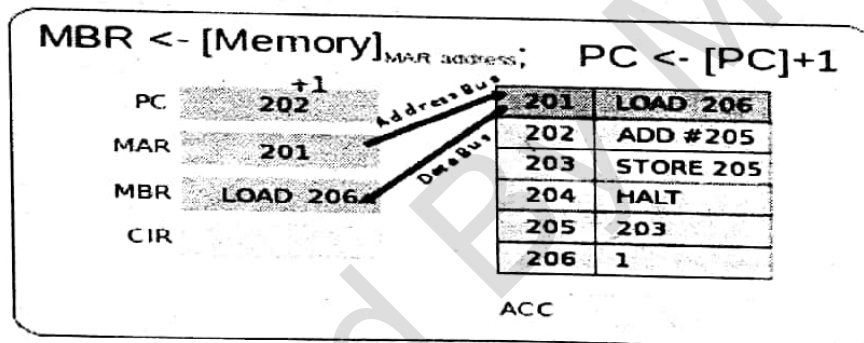
3- The MBR transfers the Instruction to Instruction Register.
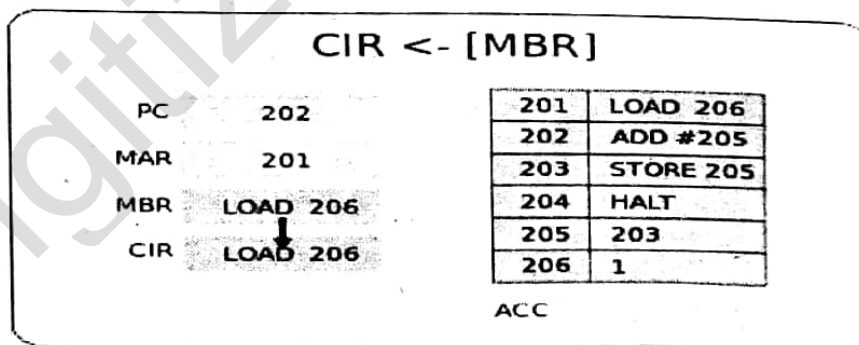
4- The instruction in Instruction Register is decoded and executed using the ALU (if necessary) and the result is stored in Acc.

The Cycle starts again!
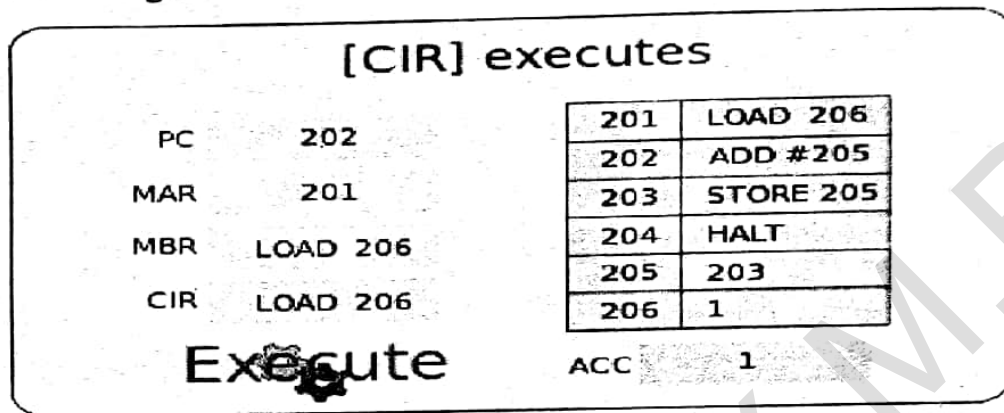
STACK

Stack is a set of memory locations in which data items may be added or removed only at one end call the "*top*" of the stack. The data items added or removed from a stack in some order. This order is known as Last In First Out (LIFO), means that the last item to be added to a stack in the first item to be removed.
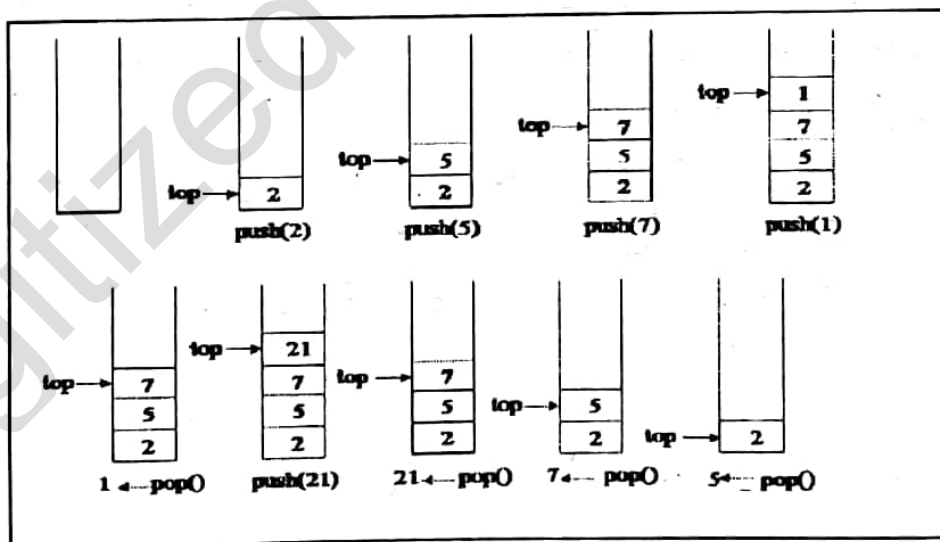
STACK OPERATION

Following terminologies are used for two basic operations associated with stack.

- **PUSH** is the term used to add an element into a stack.

- **POP** is the term used to remove an element from a stack.

SP (STACK POINTER) REGISTER

SP is the register that holds the address for a stack and contains the address of top data item in the stack. Stack Pointer is incremented when a data item is pushed into a stack. Similarly SP is decremented when the data item is popped.

INSTRUCTION CODES / ADDRESSING MODES

Microprocessor executes the instructions stored in memory (RAM). Instruction codes are group of bits that tells the computer to perform specific operations. Each of the instruction contains operation code and operand. Operation code specifies the type of action to be performed for example ADD, SUB, MVE, INC, LDA, STA etc. Operands are data on which the operation is to be performed.

1- Immediate addressing mode / immediate operand

When the second part of an instruction code specifies the operand itself (actual value) then the instruction is said to have an immediate operand or the instruction is in immediate addressing mode. In this mode an actual value is normally prefixed with a # sign.

Example: **LDA Acc, #6**

Here 6 is an immediate operand (actual value) that is loaded into Acc (accumulator register).

2- Direct addressing Mode

When the second part of instruction specifies the memory address of an operand then the instruction is said to have a direct address. In Direct addressing mode the memory address is specified where the actual operand is placed.

Example: **LDA Acc, 2805**

It loads the data from memory location 2805 into Acc (accumulator register).
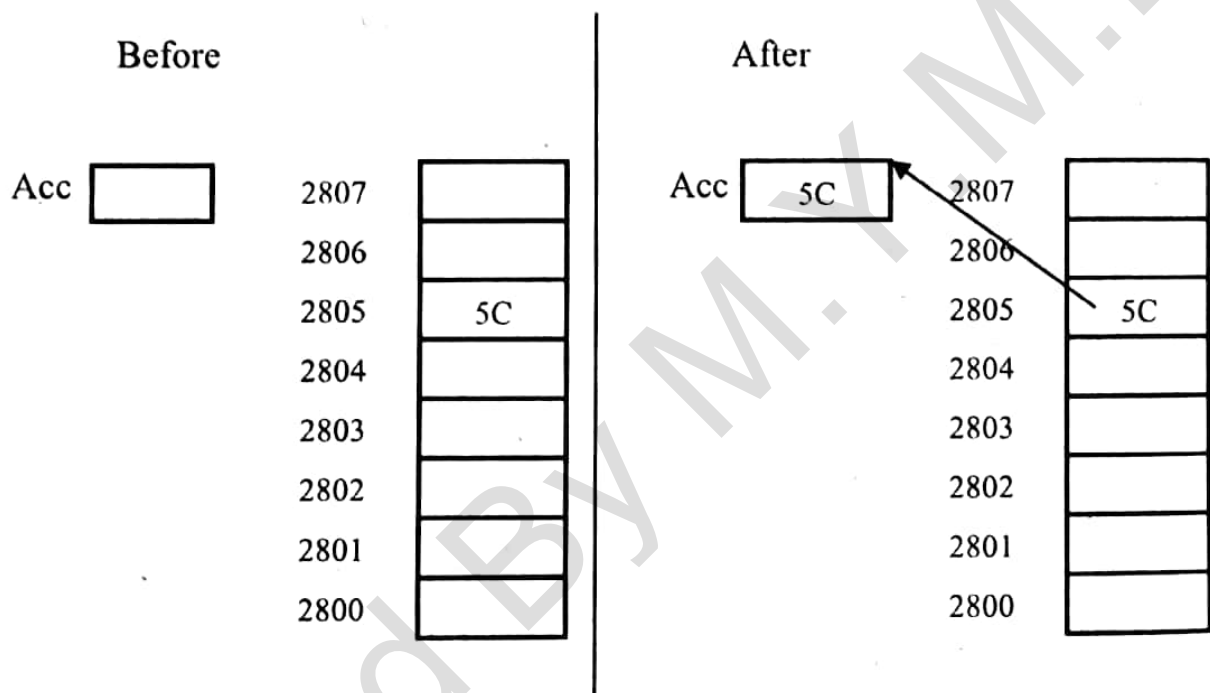
3- Indirect Addressing Mode

When the second part of instruction specifies the memory location that points to other memory address that holds actual operand, then the instruction is said to have an indirect address. In this case the number is usually enclosed with square brackets.

Example: **LDA Acc, [2802]**

It loads the data from memory location specified by the address [2802] into Acc (accumulator register).
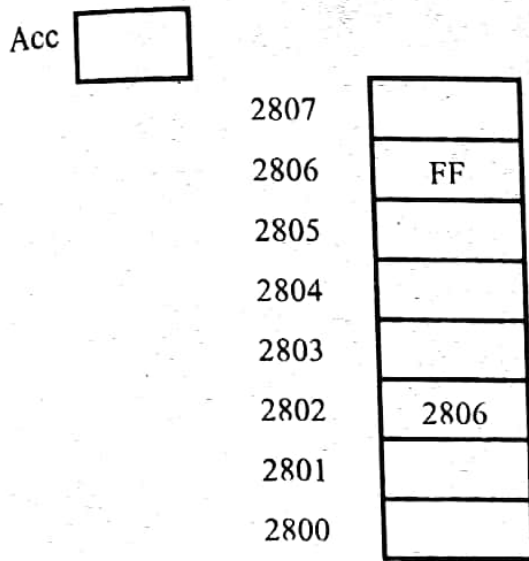
Before   After
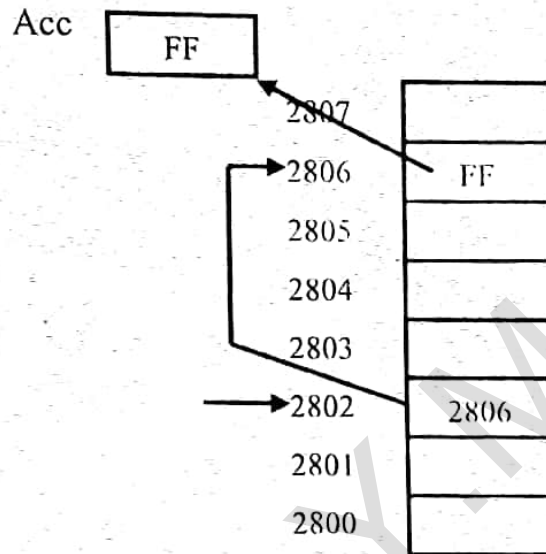
INSTRUCTION CODE FORMATS

The basic computer has three different instruction code formats. Normally the operation part of the instruction code contains three bits. The remaining bits depends upon the type of operation is to be performed. The three instruction code formats are as follows:

1- Memory-Reference Instruction Code

In memory-reference instruction code format, first bit is called mode bit and used to specify address mode i.e direct address or indirect address represented by I. If I=0 then the address mode is direct and if I=1 then the address mode will be indirect. The operation part of instruction code contains 3 bits and last 12 bits are used to specify the memory address.

I	OpCode			Address											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Memory-Reference Instruction code format

2- Register-Reference Instruction Code

A register-reference instruction normally specifies an operation on Acc(Accumulator Register). An operand from memory is not needes. In register-reference instruction code format the first bit will always be 0 with next three bits 111. The last 12 bits are used to specify the register operation.

Code 0111				Register Operation											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Register-Reference Instruction code format

3- Input-Output Instruction Code

An input-output instruction normally specifies an operation on input/output device. It does not need a reference to memory. In input-output instruction code format the first bit will always be 1 with next three bits 111. The last 12 bits are used to specify the input-output operation.

Code 1111				Input-Output Operation											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Input-Output Instruction code format

SECONDARY STORAGE DEVICES

1- MAGNETIC TAPE

Magnetic tape was the first kind of secondary storage. It resembles with the tape used in tape recorders. In the beginning magnetic tapes were mostly used as secondary device but now a day it is being used as a backup storage device. The main disadvantage of using magnetic tape is the sequential access method, which makes it a slow storage device.

2- MAGNETIC DISK

The most popular type of secondary storage device is the magnetic disks. They store data even when the electricity is not supplied to them. Hard disk is the common magnetic disk.

2.1- HARD DISK

Hard disk also known as fixed magnetic disk is used to store large amount of data permanently for a long period of time. Before using the hard disk it should be formatted first. Formatting is done by using operating system command FORMAT. After formatting, the tracks and sectors are created on the disk. **Tracks** are concentric circles on which the data is stored. Each track is further divided into smaller parts called **sectors.** Each sector is assigned a unique number to access the data.
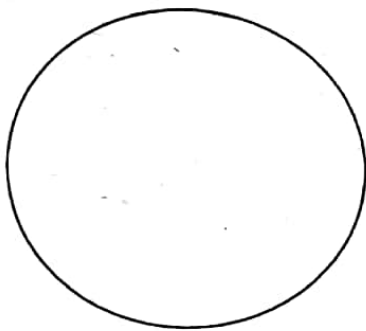
Hard disk **before** formatting   Hard disk **after** formatting
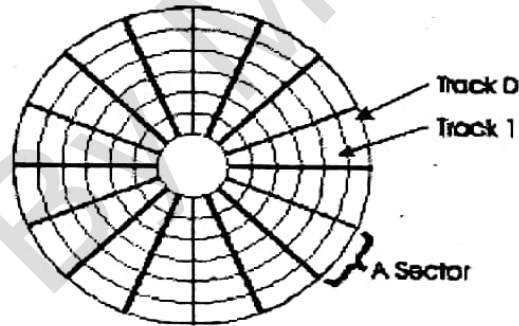
OPTICAL STORAGE DEVICES

Optical storage devices are becoming very popular secondary storage devices after magnetic storage devices. These devices fall into a category of optical storage because they store data with the help of Laser light. Following are the most commonly used optical storage devices.

1- CDROM

CDROM stands for Compact Disc- Read Only Memory. It is a popular medium for storing audio data. However, it can also be used to store large capacity software, but the information in the CD is fixed and cannot be changed. New technologics cnable

us to store and erase data from CDROM, which requires Record-able or Re-Writable CDROM.

2- DVD

DVD stands for Digital Versatile Disc, which looks like CD but it is gaining popularity because of its storage capacity. It can store data from seven to fourteen times as CDROM that makes it capable to store the video of a full-length movie. DVDs are gradually replacing the other storage media due to its storage capacity and other features.

PORT

The physical interface between system unit and peripheral devices is called a port. In other words it is a place that provides a connection point between the system box and the external devices. It allows us to plug in a cable to connect a peripheral device such as keyboard, monitor, printer etc so that they can communicate with the computer system. Most computers have several types of ports with different capabilities and uses. Some of them are as follows:

1- SERIAL PORT

Serial Ports allow serial transmission of data i.e. one bit at a time. Inside the computer a chip called Universal Asynchronous Receiver Transmitter (UART) converts parallel data from the bus into serial data that flows through serial cable. Serial port is a general-purpose interface that can be used for almost any type of device, including external modems and older computer mouse.

2- PARALLEL PORT

Parallel ports allow the parallel transmission of data i.e. several bits are transmitted simultaneously. Usually printers are connected through parallel ports. On almost all the PCs only one parallel port is present, but you can add more by buying and inserting ISA/PCI parallel port cards.

3- USB PORT

USB stands for Universal Serial Bus Port is the most recent innovation that allows connecting up to 127 peripheral devices. New devices such as digital cameras, cool disks etc are designed to connect through USB ports.

BUS

A Bus is a path between the components of a computer. It is group of parallel wires through which group of bit are transmitted from one part of computer system to another part. The number of bits that can travel simultaneously down a bus is known as **bus width**. There are two main buses Internal or System bus and External or Expansion bus.

The **System Bus** connects the CPU to other devices that resides on the motherboard. There are three types of such buses as follows:

1- DATA BUS

Data bus is an 8-bit bi-directional bus that is used to transfer 8-bit words from microprocessor to memory for WRITE operation or from memory to the microprocessor for READ operation. It can carry data as well as instructions.

2- ADDRESS BUS

Address bus is a 16-bit uni-directional bus that carries address from microprocessor to the memory to select the memory location for a READ or WRITE operation.

3- CONTROL BUS

Control bus is a uni-directional 8-bit bus that carries all the timing and control signals to synchronize[9] the operation of the microprocessor with other units.

OPERATING SYSTEM

Operating System is a type of system software that is used to manage various resources and overall operations of a computer. Its prime objective is to improve the performance and efficiency of a computer system. It provides the interface between

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[9] match

user, application program and hardware. Moreover it is designed to support the activities of software installation in the computer.

When we start computer the booting process takes place and the Operating system is loaded into memory from the computers Hard disk. It remains in the memory while the computer is running. This means that there must be at least one Operating system installed in a computer to support all the activities of a computer and other application programs. Some of the examples of Operating system are DOS, Windows, Unix, Linux etc.

FUNCTIONS PERFORMED BY AN OPERATING SYSTEM

Following are the main functions performed by an operating system:

i) Disk operations

Disk operations like storage of program and data on a disk are one of the main functions performed by Operation system.

ii) Network operations

Operating system enables to perform network operations to link computers to each other and to share resources such as hard disks, printers etc.

iii) Multitasking

Operating systems such as MS-Windows enables computer to handle more than one task at the same time like using internet, listening music and running other software etc.

vi) Multi processing

Multi-processing is a capability to support two or more processors running different programs at the same time. It increases the speed and output of the computer.

v) Multi User

It means that many users can use the computer at the same time. Operating systems such as Linux, Unix enables multiple users to use the main computer by connecting PCs or workstations at a time to perform different tasks.

Booting Process

Computer performs some processing to start, this process is known as booting process. There are two types of booting.

- **Cold Booting:** is a process in which we start our computer initially.

- **Warm Booting:** is a process in which we restart our computer in the middle of our work due to certain interruption.

TYPES OF OPERATING SYSTEM

Operating system can be classified into following categories

1- SUST (Single User Single Tasking)

As the name implies, these operating systems are designed to manage the computer so that one user can effectively do one task at a time. DOS is the example of such operating systems.

2- SUMT (Single User Multi Tasking)

These types of Operating systems are mostly used in desktop and Laptop computers; they enable a single user to work on more that one task at a time. Windows 2007, Mac OS is the example of such an operating system.

3- MUMT (Multi User Multi Tasking)

These types of Operating Systems allow the computer to be used by more than one user simultaneously, and the computer can also run multiple programs at a time. LINUX is an example of that category.

TYPES OF OPERATING SYSTEM WITH RESPECT TO INTERFACE/ OPERATING SYSTEM ENVIRONMENT

1- CLI

CLI stands for Command Line Interface. In a CLI operating environment such as DOS (Disk Operating System), user interacts with a computer by typing commands from keyboard that makes it unfriendly operating environment. Command prompt C:\> is used to indicate that the computer is ready to accept commands. Usually there is no control of mouse available in this type of Operating System. User has to memories commands for various operations such as file operations (deleting, copying and opening) or running any software.

2- GUI

GUI stands for Graphical User Interface. These operating environments were introduced to make the interaction between people and computers more user-friendly. The main features of GUI is that it uses 'windows, icons, mouse and pointer' to carry out operations such as opening, deleting and copying files, that is why it is also known as WIMP (Windows, Icons, Mouse, Pointer). The files are represented by icons, directories are represented by folders and the content of folders appears in a box/frame called window. We can use mouse rather than keyboard to apply different options in it. GUI Operating Systems are much easier to learn than CLI because we don't need to memories commands for various operations. Microsoft introduced several GUI OS such as Windows NT(New Technology), Windows XP etc. Apple Macintosh operating systems are also used in microcomputers such as Mac-OS Snow leopard, Mac-OS Mavericks etc. GEM (Graphics Environment Manager) from Digital Research was used on Atari ST computers.

Utilities

Utility programs are one of the main categories of system software. It provides the facilities to carry out the operating system tasks in a more efficient and easier way such as installing drivers, application software by the help of utility program. Examples of utilities include Windows explorer, programs that we run from control panel for installing new hardware like modem, printer etc and system maintenance utility such as backup, Disk De-fragmentation, Disk cleanup etc.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) ROM Stands for _____
2) 1 nibble is equal to _____ bits.
3) 1 GB = _____ MB
4) Set of electrical path used to transfer data is called_____.
5) Computer memory is measured in terms of _____.

Answer

1) Read Only Memory	2) 4	3) 1024	5) Bus	6) bytes

Q1b) Tick the correct option.

1) Which of the following are the two main components of the CPU?
    A- Control unit, Register   B- Registers, Main memory   C- CU, ALU   D- CU, Bus

2) Which of the unit contains ALU?
    A- Input   B- Output   C- CPU   D-None

3) The symbols used in Assembly language are _____
    A- code   B- Mnemonic codes   C- Assembler   D- All

4) Byte is a word of _____
    A- 2 bits   B- 4 bits   C- 8 bits   D- 16 bits

5) Which of the following register generates address of the next instruction to be fetched.
    A- DAR   B- DR   C- IR   D- PC

1) C	2) C	3) B	4) C	5) D

CHAPTER 6
DATA PROTECTION AND COPYRIGHT

In any organization the data plays an important role and every organization take all possible measure to protect and secure the data. The data can be lost due to the following reasons.

1- Hardware failure   2- By the action of Viruses   3- Illegal Use
4- By Power Cut

1- HARDWARE FAILURE

Hardware failure is one of the most common reasons of losing data. It is quite possible that hardware, especially the storage medium may get out of order due to some reason. In such a case, the data stored in the medium will also be lost.

2- BY VIRUSES

Usually the data get corrupted by computer viruses. Viruses can cause different types of damages to the data, which can be unaffordable to any organization.

3- BY ILLEGAL USE

A data file may be altered or damaged by accessing it illegally. Usually, such destruction is deliberate.

4- BY POWER CUT

Power cut means failure of power supply while the computer is running. Accidentally pulling out of cable from power points may also cause to loose power and will loose data as a result.

STEPS TO SECURE THE DATA FROM DATA LOST

In order to secure or protect the data from illegal use, the action of viruses, hardware failure and other such destructions, following principles/methods should be adopted.

1- Proper backup of important files and sensitive data should be maintained. It is recommended to maintain the data backup on different storage mediums. So if the actual data is lost, it may be easily recovered from its backup.

2- Important files and sensitive data must be protected by password. The password protection of data avoids the illegal access of data.

3- Anti-Virus software should be used daily or weekly to scan the storage media from viruses. This approach minimizes the destruction of viruses.

4- Uninterruptible Power Supply (UPS) should be used with the system containing important data so that if the power failure occurs, there will be no affect on the running computer.

BACKUP

Making true / mirror copy of data is known as backing up of data. This is the most important step for maintaining the security of important data. Backup provides the facility to recover the lost data.

It is extremely important to regularly copy the data stored on the computer on some safe media because due to accidental loss or destruction of data you can recover it from backup. Following are the main reasons necessary to make data backup:

1- If the storage medium (hard disk) got damaged, all data on it is lost. In such a situation, the data stored as backup can be retrieved. This can save the time and the effort of creating the data once again.

2- If the computer on which data is kept may be stolen. In this situation the data backup is used to recover the data and store it on new computer.

3- A virus may attack the computer and delete the files or the file may be deleted accidentally then we can recover our data through backup.

PASSWORD

Password is a secret code that only allows the authenticated persons to use a file and ensures its prevention from illegal use. A password is like a key for a lock. Usually a password is implemented on secret documents, user accounts, databases and other

such tasks. Passwords are usually hidden from the public environment even the passwords are not visible while typing. (* asterisks are displayed instead of characters). A good (strong) password should have upper and lower case letters, digits, and special symbols.

UPS

UPS stands for Uninterruptible Power Supply is an automated external power that keeps the computer or other device running in the event of power failure.

THE DATA PROTECTION ACT

The protection act is an act (law) passed by the government to protect the rights of the individuals against misuse of personal information by organization that holds the information. The data protection act passed by the British parliament in 1984 covers four main areas as follows:

1- All the computer systems, which process any personal data, must be registered with the data protection registrar.

2- The personal data must not be disclosed anyone outside the department that processes the data for instance a cricket club could not supply a list of its member to a local sports shop.

3- The subjects of the data (the people about whom the information is about) have a right to see the information held about them. There are certain exceptions to this.

4- Individual are given the right to compensation where they have suffered personal damage through inaccuracy or loss of personal data and they have the right to correct or erase data where applicable.

THE EIGHT DATA PROTECTION PRINCIPLES

According to Data Protection Act 1998, anyone processing personal data must follow these 8 principles:

1- Personal Data shall be obtained / processed fairly and lawfully.

- For information to be processed fairly, the data subject should know why the information is obtained / processed.

- The purpose for which personal data is collected and processed should be made clear to the data subject.

2- Personal Data shall be held only for one or more lawful purpose specified in the data user's register entry.

- Personal information collected for one reason must not be used for any other purpose.

3- Personal Data used/disclosed only in accordance with the data user's register entry.

- Personal data must not be disclosed / transferred to countries without adequate data protection laws.

4- Personal Data shall be adequate, relevant and not excessive in relation to the purpose for which they are processed.

- Information that is not relevant for the purpose must not be collected e.g Job application forms should not ask for details that only successful applicants need to give such as bank account number for salary.

5- Personal data shall be accurate and where necessary, kept up-to-date.

- It is not enough to rely on the fact that the information was provided by the data subject.

- Some reasonable steps should be taken to insure the accuracy.

6- Personal data shall not be kept for longer than is necessary for the specified purpose.

- It is necessary to review personal data regularly and delete information which is no longer required. For example records of unsuccessful candidates should not be kept longer.

- In some cases, information may be legitimately retained for years. Where it could relate to a potential legal claim.

7- Personal Data shall be available to data subject on request.

- Data subject must have a right to see what information is held about them on request, and have the right to correct, erase data that is inaccurate.

8- Personal data shall be properly protected against loss or disclosure.

- The necessary precautions should be adopted to safeguard data against unauthorized access, processing, disclosure, damage or loss such as making backup copies, installing updated antivirus software etc.

EXEMPTION FROM THE ACT

Some data is exempted from the data protection act. For example:

1- Personal detail kept for the purpose of safeguarding national securities is exempted.

2- Data held by Customs and Excise that is used for collecting taxes, is also exempted.

3- Data kept by the police for the prevention of people and for detection of crime is also exempted.

4- Data of less serious nature used for the management of personal, family or household use such as if you hold personal details of all your friends for the purpose of sending them new year cards etc, then you don't have to register your use.

COMPUTER VIRUS

A computer virus is a small hidden program that damages the data, files, programs in different ways. Just like a biological virus a computer virus can spread from computer to computer through infected floppy disk or over a computer network and infect other computer.

Disadvantages of Virus

1- The computer gets slow down.

2- The unusual error messages appear time and again.

3- The computer restarts on its own.

4- Application programs do not work correctly.

5- The program icon disappears without removing it.

6- The computer stops responding or it continuously remains busy.

7- Various files get damaged.

8- In some cases the computer doesn't starts due to virus and need to be reinstalled the operating system.

HOW DO VIRUSES SPREAD

Following are the different ways through which a virus can spread:

1- If you get an e-mail with a file attached to it (an executable program such as .exe or .com) that contains a virus and you download that file and run it, your computer will become infected.

2- If you download a file from Internet that contains a virus and you run it, your computer will become infected.

3- Viruses are also transmitted by computer networks and by infected disks.

4- If you boot a computer with an infected floppy your computer will be infected.

HOW TO PROTECT THE COMPUTER FROM VIRUSES

Following are the precautionary steps the computer users have to take to protect the computer from viruses:

1- Make sure you have got a good anti-virus and daily update it from the internet.

2- Daily or weekly scan your computer with an updated anti virus software

3- Never download and/or run an attached file on an email from a stranger or from an unknown address.

4- Never run an executable file you have just received without first running it through an updated anti-virus utility.

5- Take care in using USB disks. Always run USB disks after scanning it through anti-virus program before using it.

FORMS / TYPES OF VIRUSES   There are several forms of viruses as under:

1- BOOT-SECTER VIRUS

A *boot sector virus* is a computer virus which infects and modifies the files in the boot sector of a hard disk. Boot sector virus is also known as system virus.

2- CHERNOBAL VIRUS

A Chernobal virus deletes all the Microsoft office files. It also deletes the partition information from the disk. Once the partition information of the disk is deleted then the data on the disk cannot be accessed.

3- WORM

It spreads by replicating[10] itself. It travels through networks to different computers, and then makes many copies of itself, wasting vast amount of storage space.

4- LOGIC BOMB

Logic Bomb or simply bomb, differ from other viruses in that, it starts working at a specific date and time.

5- TROJAN HORSE

A Trojan horse is a type of virus which hides itself in some computer programs. When these programs are executed, the Trojan horse virus is activated. Usually Trojan horse virus is the part of some computer game programs. When a game is installed in the computer and run, this virus is activated.

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[10] Reproducing

6- REDLOF

Redlof is a type of virus that changes its nature with the passage of time and therefore it is difficult to catch by an anti virus program.

VIRUS HOAX

False news about the presence and destruction of a non-existing virus is called virus hoax. It is not actually a virus but just a rumor, so it can be more dangerous than actual virus because it cannot be detected or removed by anti-virus software. The main purpose of a virus hoax is to disturb the people mentally in their normal working.

Virus hoax is usually in the form of emails describing a new undetectable virus, usually using bogus technical terms. Good Times is the best example of virus hoax. It is in the form of unnamed message that informs to avoid opening or using file name with the name or first line having the word "Good times". It informs that such a file may damage the processor badly. It also urges[11] to forward the message to as many people as possible.

ANTI-VIRUS

Anti-virus is the software, which is used to detect and remove the virus from the computer. It is recommended that at least one anti-virus should be installed in the computer to protect the computer from viruses attack. Mcafee, Norton anti-virus, Dr. Solomon's anti-virus and Thunderbyte are some of the famous anti-virus software. After the anti-virus has been installed the anti-virus software should be run daily or weekly to detect and remove the viruses from the computer. If you know that your computer has been infected from the virus and the anti-virus is not detecting that virus, it means you don't have an updated version of anti-virus software. Then do change, or update the version of anti-virus software.

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[11] advise

COPYRIGHT

Copyright is the branch of the law, which protects creative works from unauthorized use by other people. It allows creators to benefit financially from their work and to keep some control over how they are used.

WORKS THAT ARE PROTECTED BY COPYRIGHT

The categories of works that copyright protects include literary, dramatic, musical, and artistic work etc. The literary work includes all the written material from novels to lyrics and to computer programs. Copyright also protects sound recording, films, sound broadcastings and books.

COMPUTER SOFTWARE AND COPYRIGHT

As copyright law protects other works, it also protects computer software in using, selling, changing, or distributing it. Making illegal copies of software and selling it is known as **pirating** and all such software are known as **pirated software**.

As software is developed after an intensive[12] hard work of a developer's team in a long period of time, so a proper check should be implemented to avoid the stealing and illegal use of software. For this purpose the software developed, should be copyrighted. The copyright law facilitates the owner of software to take action against the illegal use of the software.

COPYRIGHT INFRINGEMENT

The violation of copyright law is termed as copyright infringement. It can happen when works such as paintings, books, computer software, films and music are reproduced without permission from the copyright owners. Infringement can also occur when works such as plays and films performed, screened in other ways without permission from the copyright owners. It is a crime under copyright law and its punishment is determined by the sensitivity of matter and the intensity of loss.

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[12] thorough

COMPUTER CRIME

Computer crime can be defined as any crime that is committed by means of the special knowledge or expert use of computer technology. Now a days computer is being used in theft, blackmailing, kidnapping, threatening and in other such crimes.

Most commonly computer crime is the stealing of password, confidential data belonging to someone else, and taking the control of someone's computer using computer networks. This action is known as "hacking". Computer experts who use personal computers to break into and temper with computer systems are known as "hackers". Banks and other financial institutions is the main target of hackers. In such departments, the hackers steal money held in dormant accounts. This is where someone has died and the account still has money in it.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) Making true / mirror copy of data is known as _____ of data
2) _____ virus replicates itself.
3) The branch of law, which protects creative works from unauthorized use is known as ____
4) False news or rumors about the virus is known as_____
5) Computer experts who use personal computers to break into and temper with computer systems are known as _____.

Answer

1) back-up	2) Worm	3) Copyright	4) Virus hoax	5) Hackers

Q1b) Tick the correct option.

1) Which of the following in not an antivirus program?
   A- Redlof   B- Norton   C- Dr Solomon   D- Mcafee
2) _____ is used to secure computer from viruses.
   A- Redlof   B- Norton   C- Antivirus   D- Mcafee
3) _____ is the most important step for maintaining the security of important dat.
   A- backup   B- Decompression   C- Compression   D- Networking,
4) _____ software means making illegal copies of software and selling it.
   A- infringement   B- Pirating   C- Copied   D- Pirated
5) ____ is a secret code that only allows the authenticated persons to use a file   A- Hardwar
   A- Password   B- Backup   C- UPS   D- All

Answer

1) C	2) C	3) A	4) D	5) A

CHAPTER 7
WINDOWS OPERATING SYSTEM

MS-WINDOWS

Microsoft Windows is the most widely used operating system in PCs. It provides Graphical User Interface to interact with computer. Graphical User Interface is an environment based largely on pictures, buttons and menu options on the screen.

FEATURES OF WINDOWS

Following are some of the main features of Windows:

1- Multitasking

One of the useful features of windows 2000 is multitasking that allows the user to run more than one tasks at a time. For example a large size file download is in progress and at the same time you are working in word processing program.

2- Clipboard

Clipboard enables the user to move or copy data from one program to another. When we cut or copy any data, it stores in clipboard and then it can be pasted to anywhere in any program by the help of clipboard.

3- Running More than one program simultaneously

By using windows we can run more than one programs simultaneously. For example we can run word processing program and at the same time we can run spreadsheet program as well. We can switch between these programs by just clicking mouse button.

THE WINDOWS DESKTOP

When you turn on your computer the first screen you arrive at is known as Windows desktop. Windows desktop contains folders, programs, documents and shortcut icons. It also contains few special icons such as the Recycle Bin.

Quick Launch Bar   Task Bar   Tray

FOLDER ICONS

Folder icons open into folder windows and display the contents of particular folder.

PROGRAM ICON

Program icon loads the associated programs into memory and start the running.

SHORTCUT ICON

Shortcut icon always has arrows on them to provide alternative entry – ways to programs, documents and folders.

THE TASK BAR

The Windows taskbar is a bar with the word "start" at the left end. It is used to start up Windows applications, open document, get help, etc. Immediately to the right of the Start button is the **Quick Launch Toolbar**, which contains buttons to run the

Internet Explorer browser, Outlook Express, Show Desktop etc. In the center section of the taskbar, you will see a button for each program that is currently running and one for every folder that is currently open. These buttons give you a quick means of switching from one folder or an application to another.

The right most section is called the **tray**. It usually contains a clock that displays the current time. The tray can also contain icons for various utility programs such as Internet connection or MSN Messenger program icon.

WORKING WITH WINDOW

Buttons at the top right corner of a window allow you to expand, shrink and minimize the window. You can also resize a window by dragging its border with the mouse. To close a window, you click the close (x) button in the window's upper right corner. You can close a window by opening the file menu and selecting the last option.

WORKING WITH MY COMPUTER

My computer folder serves as the point of entry into the filing system of your computer. It is the first folder you will open and usually the last one you will close. It contains all the drives on your computer. These drive folders contain file folder and individual files. The filling system can continue indefinitely, folders can contain folders, which can contain additional folders & so on.

RECYCLE BIN

When we delete one or more files or folders from hard disk, they are not actually deleted permanently they are transferred to folder called Recycle Bin on the desktop. We can restore files or folders in the Recycle Bin. Items deleted from floppy disk or any external devices are not stored in Recycle Bin. By default Recycle Bin consumes 10% of the space on the hard disk on which the windows is installed.

INTERNET EXPLORER

Internet Explorer is the most widely used web browser developed by Microsoft and included as a part of Windows Operating System, It is used to access internet web sites.

MY DOCUMENT

In Microsoft Operating System, My Document is the name of a special folder on the computer's hard drive that is commonly used to store user's document, music, pictures, downloads and other files.

CONTROL PANEL

The Control Panel is a special folder that contains the Administrative Tools used to perform system management task such as installing/uninstalling hardware or software, managing system resources, sharing printers, and setting up date and time etc.

SEARCHING FILES OR FOLDER

To search for a file or folder, following steps are used:

1-   Click Start, and then click Search.

2-   In the Search Companion dialog box, click **All files and folders**.

3-   Type part or the entire name of the file or folder, or type a word or phrase that is in the file. (We can use **wildcard** characters like (*) for many characters and (?) for a single character when we are typing part of file name)

4-   In the **Look in** box, click the drive or drives, folder, or network location that you want to search.

FILES & FOLDERS

The data and programs are stored permanently on the disk having some name is called a file or file name where as folder or directory contains a list of files stored on the disk. It is just like a files cabinet that is used to keep the files or sub folders

RULES FOR FILE AND FOLDER NAMES

1- In Window, files and folders can have names up to 255 characters long.

2- There are few characters that file and folder names cannot include such as:

$$* \quad | \quad < \quad > \quad ? \quad / \quad `` \quad ;$$

3- Both Uppercase letters (capital letters) and lowercase letters (small letters) are allowed to use in file name.

4- Files cannot have the following reserved device names: PRN, COM1, LPT1 etc.

FILE EXTENSION

File extension is used to identify the file type. Extension can be from one to three characters long. Following are the examples of extensions that are automatically created by application programs. **.doc,.xls,.tif,.tmp** are the examples of File extension.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) Windows is an operating environment created by _____.
2) MS- Windows is _____ software.
3) Immediately to the right of the start button is the _____.
4) Windows stores deleted items in a folder called _____.
5) After window is loaded in your computer the first screen you arrive at is known as ___.

Answer

1) Microsoft	2) System	3) Quick Launch Tool bar	4) Recycle Bin	5) Desktop

Q1b) Tick the correct option.

1) The feature of an operating system that allows to work in more than one program simultaneously is _____
   A- Process   B- Clipboard   C- Desktop   D-Multitasking

2) In Microsoft windows, which shortcut key is used to "select all"?
   A- Ctrl + S   B- Ctrl + Y   C- Ctrl + A   D-Ctrl + C

3) In Microsoft windows, which shortcut key is used to copy an item?
   A- Ctrl + C   B- Ctrl + V   C- Ctrl + E   D-Ctrl + X

4) Windows also has a mailing program called _____?
   A- E-mail utilities   B- Win Zip Program   C- Navigator   D- Outlook express

5) Which of the following is used for copying and moving files and folders?
   A- Internet Explorer   B- Windows explorer   C- Control panel   D- None

Answer

1) D	2) C	3) A	4) D	5) B

CHAPTER 8

WORD PROCESSING

WORD PROCESSOR

Word processing software also called word processor is an application that provides tools for creating all kinds of text-based documents. Word processors like MS-Word enable us to add pictures, tables, columns etc in our documents.

FEATURES OF WORD PROCESSING SOFTWARE / FACILITIES PROVIDED BY MS-WORD:

Some of the most commonly used features of word processing software (Ms-Word) are as under:

1- We can easily insert and erase characters in the document.

2- A sentence of paragraph can be moved to one location to another.

3- **Undo** command can reverse the effect of last action performed and if you change your mind about reversed action you can again reverse the undo action with **Redo** command.

4- Printing the document is also one of the useful features of word processors.

5- Word processors provide a facility to search and replace characters throughout the document.

6- We can arrange text in two or more columns.

7- Spell checkers provided in word processing software can check the document for misspelled words. Moreover we can also check the grammar in the document.

8- Word processor allows arranging the text in rows and columns inserting table in the document.

9- We can add lines, boxes and pictures with in a document.

10- The **Mail Merge** feature allows sending a form, letter etc to more than one person in a very easy way and in a very short time.

MS-WORD

It stands for Microsoft Word that belongs to a family of Microsoft Office. It is a word processor and lies in a category of General Purpose application software. In Ms-Word we can work with table, columns, inserts pictures, draw various shapes and apply different formats on the text.

STARTING MS-WORD

When we run or execute Microsoft Word a window appears having different bars on the screen. The normally display toolbars at the startup are as following:

MS-Word Screen
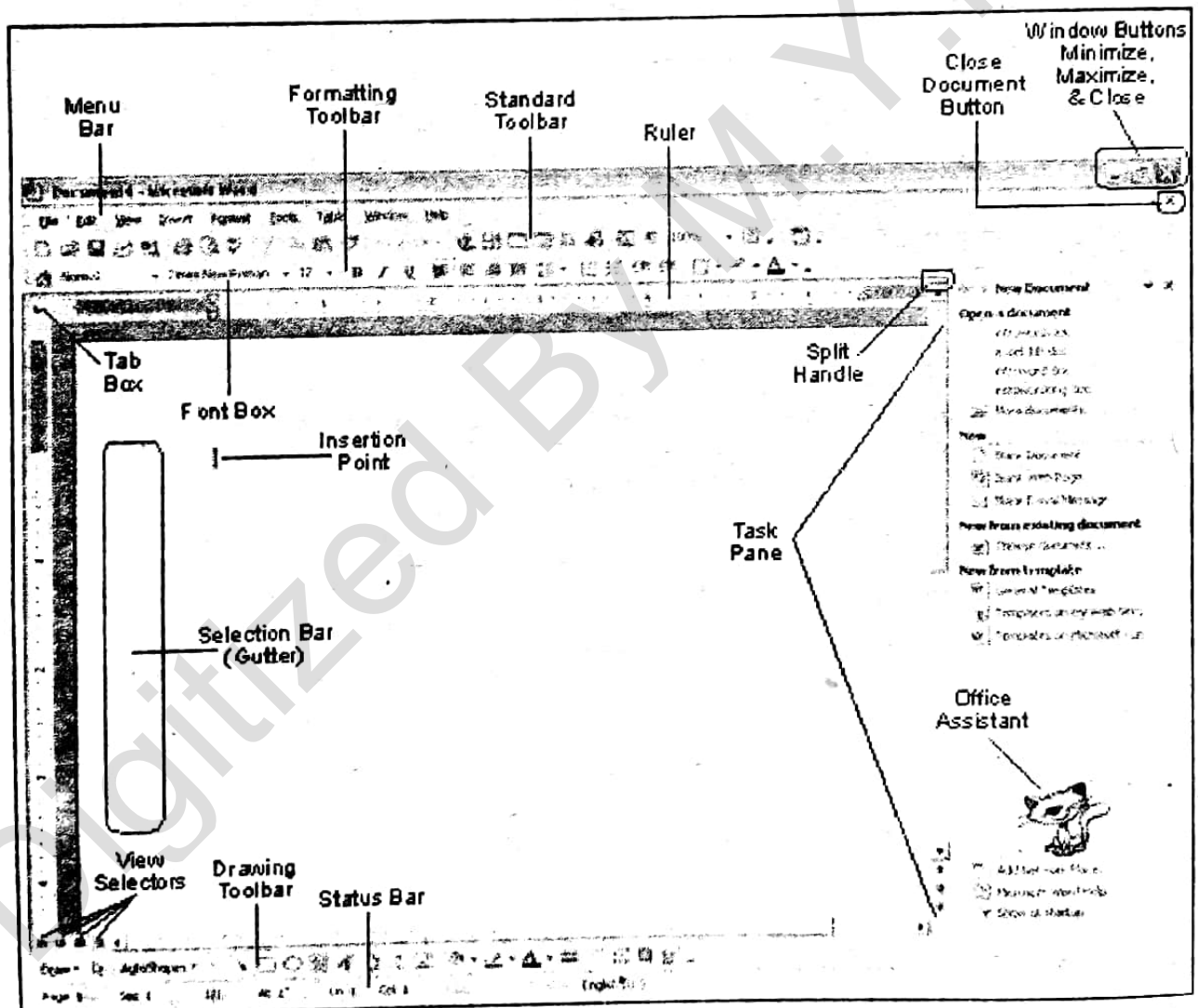
NAMES OF TOOLS AVAILABLE ON STANDARD BAR IN MS-WORD:

SNo	Tool Button	Name	SNo	Tool Button	Name	SNo	Tool Button	Name
1-		New	2-		Open	3-		Saves
4-		Print	5-		Print	6-		Spelling
7-		Cut	8-		Copy	9-		Paste
10-		Format painter	11-		Undo	12-		Redo
13-		Tables and Borders	14-		Insert a table	15-		Insert an Excel spreadsheet
16-		Columns	17-		Drawing	18-	75%	Zoom

NAMES OF TOOLS AVAILABLE ON FORMATTING BAR IN MS-WORD:

SNo	Tool Button	Name	SNo	Tool Button	Name	SNo	Tool Button	Name
1-	Arial	Font	2-	9	Font Size	3-	B	Bold
4-	I	Italic	5-	U	Underline	6-		Aligns left
7-		Center	8-		Aligns right	9-		Justify
10-		Numbering	11-		Bullets	12-		Comma Style
13-		Decrease Indent	14-		Increase Indent	15-		Borders
16-		Highlight	17-	A	Font Color			

1- TITLE BAR

Title bar appears at the top of the screen, which shows the current working file name. At the end of this bar some buttons are shown, which are called window control buttons are as follows

- **Minimize:** Reduces an application or document window to an icon to the task bar.
- **Maximize:** Enlarge the application or document window to the screen.
- **Restore:** It restores a window to its previous size and location.
- **Close:** Used to close the application. Prompt you to save any unsaved changes before closing the application.

2- MENU BAR

Menu Bar contains a menu of commands used in Ms-Word like File, Edit, and View etc.

3- STANDARD BAR

The most frequently used buttons are displayed at this bar e.g. save, open, cut, and copy etc.

4- FORMATTING BAR

Formatting Bar is used to apply formats on the text e.g. bold, italic, and underline etc.

5- SCROLL BAR

Scroll bars are used to move the page from top to bottom and bottom to top, from left to right and right to left. There are two scroll bars in MS- Word as follows:

- **Vertical Scroll Bar:** Vertical scroll bar is used to move the display from top to bottom and from bottom to top.
- **Horizontal Scroll Bar:** Horizontal Scroll Bar is used to move the display from left to right and from right to left.

6- DRAWING BAR

This tool bar is displayed at the bottom of the screen and used to draw lines and different shapes such as circle, oval, rectangle etc. we can also use **Word Art** and **Clip Art** with the help of this bar. This bar can returned on and off by the clinking drawing button on the standard tool bar.

- **Word Art:** With the help of Word Art we can insert text by different effects.
- **Clip Art:** It is a gallery of pictures through which we can insert the pictures in our document.

7-STATUS BAR

Status bar is located at the bottom of the screen where we can view page no, line no, column no etc.

WORD WRAP

We create document by typing on the keyboard. This process is known as entering text. When the text reaches at the right edge of the screen, there is no need to press the Enter Key. The word processor automatically moves the insertion point to the next line. This feature of word processor is known as Word Wrap.

HEADER AND FOOTER

Header and Footer option is used to include any extra information such as page number, number of pages, file name, date, time etc on every page of the document. Headers are placed at the top and Footers are placed at the bottom of the page.

TABLE

Table option is used when we want to organize our data in terms of rows and columns. We can also perform arithmetical operations such as addition, subtraction etc on the numeric data. The table can be inserted as well as drawn by the help of mouse pointer.

COLUMNS

Through column option we can arrange the text into pre-defined number of columns like in a newspaper or magazine. To create columns in a document we can either convert existing text to the columns or we can first create columns and then enter the text in them.

MAIL MERGE

We use mail merge option when we want to send form, letter or any other document to more than one-person .It requires two files to be merged.

i) Data Source: A data source contains the record of each individual.

ii) Main Document: The main document contains merge fields into which data is placed.

MACRO

A macro is a collection of keystrokes that is created, saved and later recalled by typing an assigned short cut key or selecting a menu item. A macro command can be used by clicking Tools in the menu bar and selecting Macro.

FOOTNOTE AND ENDNOTE

Footnote and Endnote are used to provide more information about the topic or any word in the document. We can insert both Footnote, which appears at the bottom of the page, and Endnote, which appears at the end of document. Footnote and Endnote is used by clicking Insert on menu bar and selecting Reference and then Footnotes.

DRAG AND DROP

Drag and Drop techniques is used to cut, copy or link text from one screen location to another. It is an alternative and easy way of cut and copy command.

OFFICE ASSISTANT

Office Assistant provides Help Topics and Tips to help you complete your task. F1 is the shortcut key for Help.

HYPERLINK

Hyperlink is a connection between two areas on a same document of between two different files. This option is usually used in Internet sites. Hyperlinks are underlined and appear in different color. By default it appears in blue color with underline.

SPELLING AND GRAMMAR CHECKER

Help us to correct misspelled words or any grammatical mistakes in the document. MS-Word checks the word in its dictionary and if it doesn't find the word in the dictionary then it shows **red underline** and if there is any grammar mistake in the sentence then it will be **underlined green**.

BUILT-IN THESAURUS

Built-in Thesaurus is used to see the synonyms of the selected word and we can also change the selected word to its synonym. We can see the synonym by Right-clicking the word we want to find a synonym for and choosing synonym option from pop-up menu.

SHORTCUT KEYS USED IN MS-WORD AND MS-EXCEL

Sno	Shortcut Key	Description	Sno	Shortcut Key	Description
1)	CTRL+N	Create a new document	13)	CTRL+V	Paste text or an object
2)	CTRL+O	Open a document	14)	CTRL+Z	Undo the last action
3)	CTRL+W	Close a document	15)	CTRL+Y	Redo the last action
4)	CTRL+B	Make letters bold	16)	CTRL+F	Find text.

5)	CTRL+I	Make letters italic	17)	CTRL+H	Replace text
6)	CTRL+U	Make letters underline	18)	CTRL+P	Print a document
7)	CTRL+C	Copy the selected text or object	19)	CTRL+A	Select All
8)	CTRL+X	Cut the selected text or object	20)	CTRL+5	Set 1.5-line spacing
9)	CTRL+E	Center a paragraph	21)	CTRL+J	Justify a paragraph
10)	CTRL+L	Left align a paragraph	22)	CTRL+R	Right align a paragraph
11)	F7	Spelling & Grammar Check	23)	F1	Help
12)	CTRL+SHIFT+E	Track Change	24)	CTRL+G	Go to

SOLVED EXERCISE

Q1a) Fill in the blanks

1) A Central feature of all word processors is a feature known as_____

2) MS word is an _____ software.

3) While typing in a document in a word processing program, you will see a blinking vertical line as the _____ which indicates where the next character will appear.

4) The shortcut of center align is _____.

5) _____ is a specified text at the top of each page.

Answer

1) Word Wrap	2) Application	3) insertion point / cursor	4) Ctrl + E	5) Header

Q1b) Tick the correct option.

1) A Word processor can be used for_____

    A- write text   B- edit text   C- print text   D- All

2) The tool used to find a similar word in a document is called_____

    A- Finder   B- Thesaurus   C- Dictionary   D- Find and Replace

3) The shortcut key for cut is _____

    A- Ctrl + C   B- Ctrl + Z   C- Ctrl + X   D- Ctrl + F

4) _____ is used to arrange your data into rows and columns.

    A- Table   B- Columns   C- Rows   D- Cell

5) _____command can reverse the effect of last action performed

    A- Undo   B- Redo   C- Cut   D- Copy

Answer

1) D	2) B	3) C	4) A	5) A

CHAPTER 9
SPREADSHEET PROGRAMS

SPREAD SHEET

Spreadsheet is a grid of rows and columns that hold a large amount of data (usually numeric data). A typical spreadsheet program provides all sorts of tools for arranging data and performing mathematical calculations. A spreadsheet interface provides a menu bar, tool bar, and a special formula bar by which we can create or edit data and formula in the worksheet.

MS- EXCEL

Ms- Excel is a spreadsheet and lies in a category of general-purpose application software. We can perform different calculation on numeric data. Moreover there are number various features which include formulas, functions, charts -etc. The extension of a file created in excel is .xls.

WORK BOOK

In Ms- Excel a workbook is a file in which we work and store data. Each workbook can contain many sheets. By default it has three worksheets but we can add a maximum number of 255 sheets in one workbook.

WORK SHEET

A worksheet is made up of rows and columns into which we enter and edit data. We can work on several worksheets simultaneously and perform calculation based on data from multiple work sheets. Each worksheet has 256 column and 65536 rows.

CELL   The intersecting point of row and column is known as a cell and the cell where the insertion point is positioned is known as a current cell or active cell.

HOW CELLS ARE IDENTIFIED

The columns within the work area are identified by letters shown at the top of the work area. Similarly, the rows are identified by numbers shown at the left side of

the work area. The cells are identified by the combination of column letter and row number.

SHEET TABS

Sheet tabs appear at the bottom of the workbook, which shows the name of worksheets. We can also switch from one worksheet to other through these tabs.

MS-Excel Screen
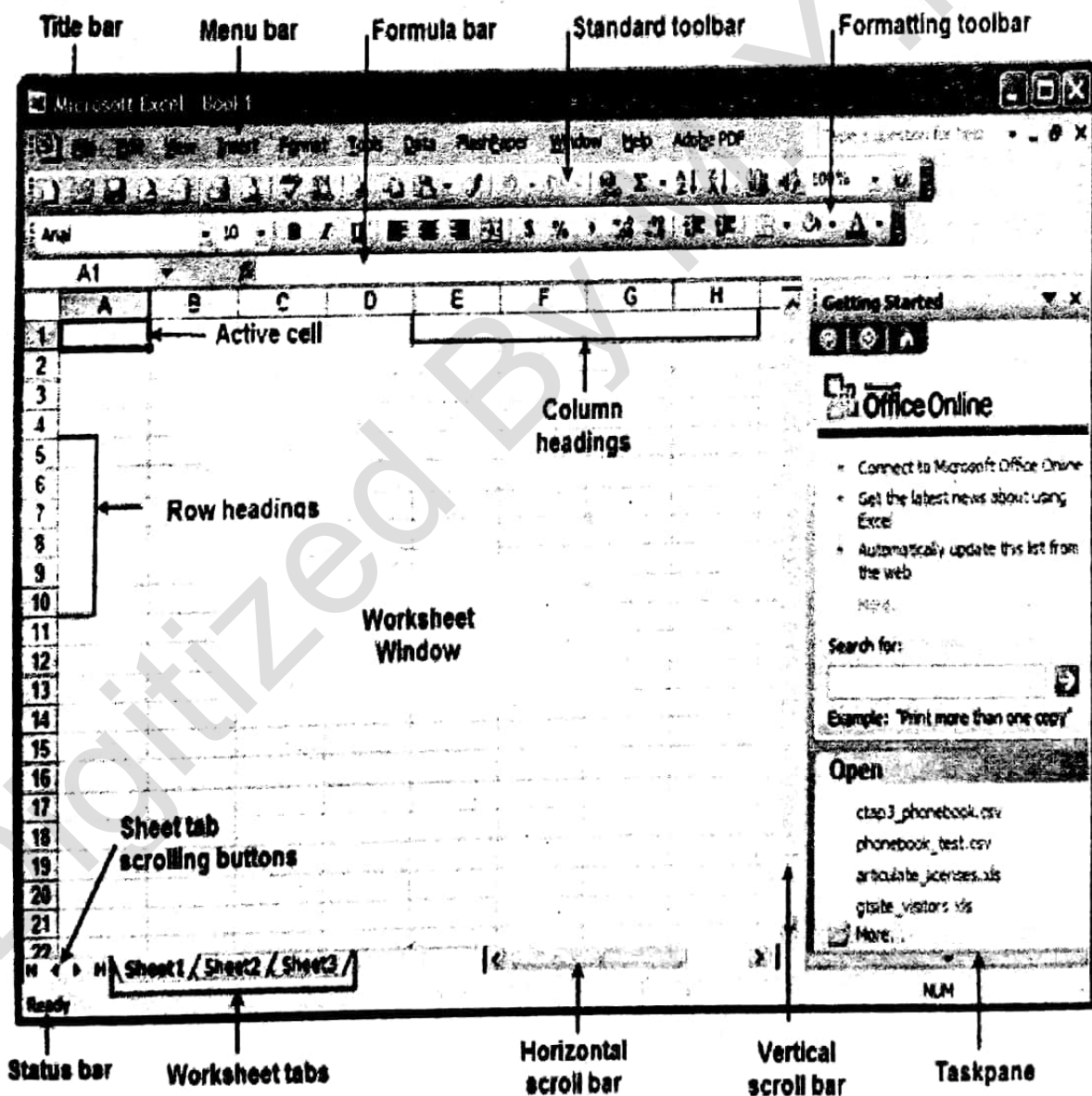
NAME OF TOOLS ON STANDARD BAR IN MS-EXCEL

SNO	Tool Button	Name	SNO	Tool Button	Name	SNO	Tool Button	Name
1-		New	2-		Open	3-		Saves
4-		Print	5-		Print	6-		Spelling
7-		Cut	8-		Copy	9-		Paste
10-		Format painter	11-		Undo	12-		Redo
13-		Auto Sum	14-		Sort Ascending	15-		Sort Descending
16-		Chart Wizard	17-		Drawing	18-		Zoom

NAME OF TOOLS ON FORMATTING BAR IN MS-EXCEL

SNO	Tool Button	Name	SNO	Tool Button	Name	SNO	Tool Button	Name
1-	Geneva	Font	2-	9	Font Size	3-	B	Bold
4-	I	Italic	5-	U	Underline	6-		Aligns left
7-		Center	8-		Aligns right	9-		Merge and Center
10-	$	Currency Style	11-	%	Percent Style	12-		Comma Style
13-		Increase Decimal	14-		Decrease Decimal	15-		Decrease Indent
16-		Increase Indent	17-		Borders	18-		highlight
19-	A	Font Color						

FORMULA

Formula is an equation that performs operation on work sheet data. Formula can perform mathematical operation such as addition, subtraction, and multiplication using arithmetic operators. Signs used for different operations are +, -, * ,/ , ^ .

FUNCTION

Functions are built-in formulas that perform calculation by using specific value called arguments. Most major spreadsheet programs offer round about 100 different functions. We can calculate averages, square roots, payments or earning etc using functions. Some commonly used functions in excel are as follows:

i) sum() :   sum() function is used to add the values.

ii) average():   average() function is used to calculate the average.

iii) max():   max() is used to find the maximum value in a group of values.

iv) min() :   min() is used to find the minimum value in a group of values.

v) today():   today() is used to find the current date

FEATURES OF SPREADSHEET /FACILITIES PROVIDED BY MS-EXCEL

1- We can enter and store huge amount of data in spreadsheets / Ms-Excel.

2- We can use formulas and functions for calculating numeric data.

3- Formula results are recalculated automatically whenever the values changes in cells, the result of formula or function will be automatically updated.

4- Most spreadsheet programs offer few data base management capabilities i.e. tools for managing lists, sorting the data alphabetically or numerically.

5- Multiple worksheets can be linked so that a formula in one sheet can refer to cells in another sheet.

6- Chart is used to graphically represent the numeric data entered in a worksheet. Different chart types can be used for different purposes in Ms-Excel.

DIFFERENCE BETWEEN WORD PROCESSOR AND SPEREADSHEET PROGRAMS

Word Processor programs	Spreadsheet programs
1) It provides the facility for typing applications, letters and other documents etc.	It provides the facility to work with various mathematical and statistical formulas.
2) MS word is an example of word processor program.	MS-Excel is an example of spreadsheet program.
3) A word document contains many blank pages where we type anything according to our needs.	A workbook contains many worksheets which consist of rows and columns where we enter our data.
4) We can add pictures, tables, columns etc in it.	We can add graphical chart in it.

SOLVED EXERCISE

Q1a) Fill in the blanks

1) Work Sheet in Excel has _____ numbers of columns.
2) _____ function is used to find current date.
3) A _____ is a grid of rows and columns in which you can enter numbers and text.
4) In a worksheet, a _____ is identified by the combination of column letter and row number.
5) While using a worksheet program, your are positioned in a single cell is known as____cell

Answer

1) 256	2) today()	3) spreadsheet	4) cell	5) active

Q1b) Tick the correct option.

1) A workbook is a group of _____.
   A- Many rows   B- Many Columns   C- Worksheets   D- Least Numbers of columns
2) In a spread sheet, columns are labeled_____.
   A- by letters   B- by numbers   C- by cell reference D- None
3) A block of cells in spreadsheet is called_____.
   A- Range   B- column   C- Function   D- Table
4) Which of the following is an appropriate formula to calculate the percentage of marking cells B2,B3,B4.
   A- =(B2+ B3+ B4)/300 *100   B- (B2+ B3+ B4)/300 *100 C- =B2+ B3+ B4/300 *100
   D- (B2+ B3+ B4/300) *100
5) Sheet tabs appear at the _____of the workbook, which shows the name of worksheets.
   A- Right   B- Left   C- Top   D- Bottom

Answer

1) C	2) A	3) A	4) A	5) D

CHAPTER 10
INTERNET BROWSING AND E-MAIL

INTERNET

Internet can be defined as "The network of networks" It is an International network connecting thousands of people to communicate with each other. It is difficult to judge the size of the Internet, people and systems are being added daily. In fact the Internet has grown at an exponential rate since its beginning.

ORIGIN OF INTERNET

The Internet's roots can be traced back to the late 1960s, when the Advanced Research Projects Agency or ARPA, under the US Department of Defense designed a network to safeguard military information stored on computers all over the country. Originally called ARPANET, this network connected strategically located computers so that if one link were destroyed by an attack or natural disaster, surviving computers could continue to communicate with each other.

In 1985, the National Science Foundation (NSF) funded several national supercomputer centers and enabled regional and university computer centers to connect to them. The initial motivation to connect these was the availability of remote access to these supercomputer resources. This event marked the birth of the Internet, as we know it today.

Over the years, many universities, research facilities and private companies all over the world have hooked up to this network to exchange information. More recently, millions of organizations and individuals have connected to the Internet to access, publish and discuss vast amounts of information on just about every topic. The concept of having instant access to a global information resource at home, at school and at work has already changed the way we work with and think about information.

REQUIREMENTS TO ACCESS INTERNET THROUGH DIAL-UP CONNECTION

1- HARDWARE REQUIREMENT

i) TELEPHONE CONNECTION

User should have a telephone connection to connect with Internet.

ii) MODEM

Since the transmission over telephone line should be in the form of analog signals so Modem is required to convert the digital data to analog signals and vice versa.

2- SOFTWARE REQUIREMENT

In order to access to Internet sites at least one web browser should be installed in the computer. Web browsers such as Internet explorer, net-escape navigator makes it possible to have access to different web sites.

3- ISP CONNECTION

Apart from hardware and software requirement an ISP connection is also required. ISP (Internet Service Providers) is a company that provides internet connections.

TYPES OF CONNECTION

1- Dial-Up Connection

In a dial-up connection the computer uses its modem to dial a telephone number given by the ISP (Internet Service Provider). This establishes the connection between the PC and ISP's server. Like any phone call, the connection is temporary. It begins when the ISP's server answer and ends when your PC or the server ends the communication. The modem used in dial-up connection usually transmits data at the rate of 56 Kbps.

HIGH SPEED / BROADBAND CONNECTIONS

The High Speed services are called Broadband connections, because they use media that can handle multiple signals at once, such as fiber optics, microwave, and other advanced technologies. To be considered as broadband, the connection must be able to transmit data at a faster rate than is possible with dial-up connection. Following are the broadband connections:

1- Integrated Services Digital Network (ISDN)

ISDN service operates on Standard Telephone Lines but requires a special modem and phone service. The benefit of ISDN is that it connects PCs, telephones, and fax machines to a single ISDN line and we can use them simultaneously. The data transmission speed of ISDN line is 128 Kbps.

2- Digital Subscriber Line (DSL)

DSL is a more advanced service than ISDN service. It also requires a special type of DSL modem that connects a telephone and a PC at the same time. Asymmetric Digital Subscriber Line (ADSL) is a type of DSL that provides much faster data transfer rate. The standard transmission speed of DSL ranges from 128 Kbps for basic DSL service to 30 Mbps for high-end service.

3- Cable-TV Line

It provides a high speed Internet connection through the Cable Television network. A cable modem sends and receives data over cable television line. Its data transmission speed is from 128 Kbps to 3 Mbps.

4- T-Carrier Lines

These are the very fast digital lines that can carry multiple signals over a single communication line. The T-carrier lines are very expensive and just large companies can afford these lines. The most common T-carrier lines are:

- **T1 Line:** The most popular T-carrier line is the T1 line. Its data transmission speed is 1.522 Mbps. Many ISPs use T1 lines to connect to the internet.

- **T3 Line:** Another most popular and fastest T-Carrier line is T3 Line. Its data transmission speed is 44.736 Mbps. It is more expensive than T1 line as well.

4- Asynchronous Transfer Mode (ATM)

It is a very fast data transmission connection line that is popular for transmitting live videos and multimedia. Its data transmission speed is from 155 Mbps to 600 Mbps.

SERVICES / COMPONENT OF INTERNET

1- WWW

WWW stands for Worlds Wide Web is simply referred to as Web. It is a network that is spread over the entire world connecting the whole world together, therefore www can also be called as Internet because nearly 70 percent of all the information searches are handled through the World Wide Web.

2- EMAIL

E-Mail is an electronic message from sender to a recipient or multiple recipients. Compared to postal, email is the fastest and reliable way to send messages from one location of the world to another. You can also send documents, pictures, audio and video files via e-mail by attaching the file with the e-mail.

3- NEWSGROUPS

Newsgroups are electronic discussion groups on the Internet through which people with same interest exchange information and ideas. You can leave messages or answer messages left by other members of the group.

4- FTP

FTP stands for file transfer protocol it is a protocol used to transfer files from web servers to the computer.

5- CHATTING

Internet also provides the facility to internet users to chat with people online all over the world. Different programs like MSN messenger, Yahoo messenger, Skype etc are available for chatting on the internet. We send messages by typing on the keyboard to the online people and receive the reply from others instantly. Some programs also support voice and video chat as well.

6- TELNET

Telnet is an Internet service or tool that is used to logon and run commands on a remote server on the Internet. Telnet provides a prompt on the screen through which you can access the host computer and can give commands to that computer. You will feel that you are sitting in front of the host computer and operating it.

INTERNET PROTOCOLS

Various protocols are used in the Internet communication the most commonly used protocols are as follows:

1- TCP / IP   *Discussed In Chapter No 2*

2- HTTP

HTTP stands for Hyper Text Transfer Protocol used to transfer the hyper text over the internet.

3- SMTP

SMTP stands for Simple Mail Transfer Protocol. As the name implies this protocol is used to transfer mails over the Internet.

4- FTP

FTP stands for File Transfer Protocol used to transfer files on the internet. It provides the facility to download a file from a web.

INTERNET ADDRESS   There are two types of address used in the Internet.

1- URLs

URLs stand for Uniform Resource Locators. These are actually addresses used to identify a web sever. The URLs are typed in the Internet browser programs to access and display information of a particular page. The example of a URL is as:

http:\\ www.pakistan.gov.pk

In the above example "http" is a protocol which stands for hypertext transfer protocol, "www" specifies that we are using the web, it stands for World Wide Web, and "Pakistan.gov.pk" specifies the domain name, the ".gov" stands for government and ".pk" is for pakistan

2- EMAIL ADDRESS

E-mail addresses are used to identify a particular user on the Internet for sending and receiving electronic message. The example of an email address is as follows:

abc@ hotmail.com

In the above example "abc' is identifying the name of the email or user, "hotmail.com" is the mail server where the emails are saved and accessed.

WEB BROWSER

Web browser is a kind of software that is designed to let you access and navigate the web sites. These days Internet explorer and Netscape Navigator is mostly used web browsers because they include e-mail capabilities, newsreaders and tools for downloading file.

BROWSING THE WEB

Browsing the web means visiting (looking) the sites reading the contents of the web sites. There are two types of browsing as follows

- **Online Browsing**

Online browsing means browsing while the Internet is connected and the web pages are requested to web servers.

- **Offline Browsing**

Offline browsing means browsing with out connecting the Internet. Offline browsing can be done on those web site pages that are save while the Internet was connected.

SURFING THE WEB

While working on the web user may jump from one page to another using links to jump from site to site is commonly known as surfing the web.

WEB SERVER

Web server is a computer that works as a home for web sites. It hosts the web site as if it is a guest. It is associated with a unique address, which is called Internet protocol address and can be accessed by that address.

DOMAIN NAME SERVER (DNS)

Since the IP addresses of servers are difficult to remember. So the user-friendly address like www.subscriber.com is associated with the IP addresses (like 16.15.130.83). The Domain Name Server is a machine that resolves the string address into numeric address.

EMAIL SERVERS

This is the server that is in charge of keeping track of the electronic mails boxes of the clients. This server more or less works as a PO Box. All the email coming at the clients email address stored in his mailbox called personal inbox. The client accesses it frequently to check his mail

HTML

HTML stands for Hyper Text Mark-up Language is the major language of the Internet's World Wide Web. Web sites and web pages are written in HTML. This language provides the facility of creating links among the various documents. Moreover it uses special types of commands known as tags to format the document.

With HTML we have the ability to bring together the text, pictures, sounds, videos etc in one place.

SEARCH ENGINE

A **web search engine** is designed to search for information on the World Wide Web. Information is quickly found in the World Wide Web through typing key words. The search results from search engine are then listed and we can choose the result from the list found. The information may consist of web pages, images and other types of files. Google, alltheweb, hotbot, infoseek, lycos etc are the famous search engines.

COMMON DOMAIN NAMES FOR US INTERNATIONAL SITES

.com	commercial
.gov	government
.mil	military
.net	network
.org	organization
.edu	education

COMPRESSION

File compression means translation of file into a coded format that occupies less space than original file. The files/ data can be compressed for the following reasons

1- To save room on disk.

2- To save time when sending data from one computer to another.

Various softwares are available to compress or decompress the files/data some of them are PKZIP, WINRAR, and WINZIP etc.

ADVANTAGES OF INTERNET

The main Advantages of using internet are as follows:

1- Sharing Information

Using Internet you can share information with other people around the world. The scientists or researchers can interact with each other to share knowledge and to get guidance as well. Sharing information on the internet is very easy, cheap and fast.

2- News

You can get latest news of the world on the Internet. Most of the newspapers of the world are also available on the Internet. They have their websites from where you can get the latest news about the events happening in the world.

3- Searching Jobs

You can search different types of jobs all over the world. Most of the organizations around the world advertise their vacancies on the Internet. You can apply for the required job through Internet as well.

4- Advertisement

Today, most of the commercial organizations advertise their products through Internet. It is very cheap and efficient way for the advertisement of the products. The products can be presented in attractive and effective way to the people around the world.

5- Online Education

Internet provides the facility to get online education. Many websites of different educational institutes provide lectures and tutorials on different subjects or topics. You can download these lectures or tutorials on your own computer as well.

6- Online Results

Most of the universities and educational boards display results on the internet. The students can see their results in any part of the country or world.

DISADVANTAGES OF INTERNET

Following are some of the disadvantages of Internet.

1- Viruses

Today, Internet is the common source of spreading viruses. Most of the viruses transfer from one computer to another through e-mail or when information is downloaded on the computer from the internet. These viruses create different problems in your computer and can affect the performance of your computer.

2- Immorality

A major concern from educators and parents is that the child may access indecent or restricted sites using Internet that contains immoral or adult natured materials in the form of text, pictures or movies.

3- Confusion about the Accuracy of Information

A lot of information about a particular topic is stored on the websites. Some information may be incorrect or not authentic. So it becomes difficult to select the correct information. Sometimes you may be confused about the accuracy of the information.

4- Wastage of time

A lot of time is wasted in collecting the information on the Internet. Some people waste a lot of time in chatting or in playing games. At home and in offices, most of the people use Internet without any positive purpose.

BENEFITS OF EMAIL

1- Email is a very fast way of communication. An email reaches its destination with in few seconds.

2- One message can be sent to more than one person with a single email.

4- We can attach files, pictures, and videos with email.

5- We can send email to anyone at any time.

6- It is not necessary that the receiver of email is using the internet when you send the email. He/She can check the email at anytime.

7- Email conversations provide a built-in record of what you've asked for and what information you've received. By saving a copy of the messages you send, you can keep track of exactly what you asked for and when.

SHORTCUT KEYS TO USE INTERNET

Sno	Shortcut	Description	Sno	Shortcut	Description
1)	F1	Display Internet explorer	7)	CTRL+E	Open the Search
2)	TAB	Move forward through the	8)	CTRL+I	Open the
3)	ALT+HOME	Go to your Home page	9)	CTRL+H	Open the History
4)	ALT+RIGHT ARROW	Go to the next page	10)	CTRL+F	Find text.
5)	ALT+LEFT ARROW	Go to the previous page	11)	CTRL+O or CTRL+L	Go to a new location
6)	CTRL+U	Make letters underline	12)	CTRL+P	Print a document

SOLVED EXERCISE

Q1a) Fill in the blanks

1) _____ the web means jumping from site to site to access information.
2) The root of internet can be traced back to the late_____.
3) Most websites and web pages on the internet are written using _____ language.
4) URL stands for_____.
5) Internet explorer is a_____.

Answer

1) Surfing	2) 1960s	3) HTML	4) Uniform Resource Locator	5) Web Browser

Q1b) Tick the correct option.

1) A computer can be linked to the internet through
    A- DSL   B- Cable modem   C- Phone modem   D-All
2) Which of the following is NOT a search Engine?
    A- Info Seek   B- Face book   C- Excite   D- Lycos
3) Web sites designed to help users search for information on the web are known as_____
    A- Chat Room   B- Search engine   C- Teleconference   D-Browser
4) File _____ means translation of file into coded format that occupies less space.
    A- Compression   B- Encryption   C- Password   D- None
5) _____ is an instantaneous electronic message from sender to a recipient or recipients.
    A- Email   B- Chat   C- Facebook   D- All

1) D	2) B	3) B	4) A	5) A

1	ALU	Arithmetic Logic Unit
2	ANSI	American National Standard Institute
3	ARPANET	Advanced Research Project NETwork
4	ASCII	American Standard Codes for Information Interchange
5	ATM	Automatic Teller Machine
6	BASIC	Beginners All Purpose Symbolic Instruction Codes
7	BCD	Binary Coded Decimal
8	BIT	BInary digiT
9	CAD	Computer Aided Designing
10	CAM	Computer Aided Manufacturing
11	CBT	Computer Based Training
12	CCD	Charged Coupled Device
13	CD ROM	Compact Disc Read Only Memory
14	CGA	Color Graphics Adaptor
15	CIM	Computer Integrated Manufacturing
16	CLI	Command Line Interface
17	COBOL	Common Business Oriented Language
18	CPU	Central Processing Unit
19	CRT	Cathode Ray Tube
20	CSMA/CD	Carrier Sense Multiple Access with Collision Detection
21	CU	Control Unit
22	DAR	Data Address Register
23	DR	Data Register
24	DHTML	Dynamic Hyper Text Markup Language
25	DOS	Disk Operating System
26	DRAM	Dynamic Random Access Memory
27	DSL	Digital Subscriber Line
28	DVD	Digital Versatile / Video Disc
29	EBCDIC	Extended Binary Coded Decimal Interchange Code
30	EEPROM	Electrically Erasable Programmable Read Only Memory
31	EMI	Electro Magnetic Interference
32	EPROM	Erasable Programmable Read Only Memory
33	FDDI	Fiber Distributed Data Interface
34	FOTRAN	FOrmula TRANslation
35	FTP	File Transfer Protocol
36	GUI	Graphical User Interface
37	HTML	Hyper Text Markup Language
38	HTTP	Hyper Text Transfer Protocol
39	IBM	International Business Machine
40	IC	Integrated Circuit
41	IEEE	Institute of Electrical and Electronics Engineers
42	IR	Instruction Register
43	ISDN	Intergraded Services Digital Network
44	ISO	International Standard Organization
45	ISP	Internet Service Provider
46	IT	Information Technology
47	LAN	Local Area Network

48	LASER	Light Amplification by Stimulated Emission of Radiation
49	LCD	Liquid Crystal Display
50	MAN	Metropolitan Area Network
51	MODEM	MOdulation DEModulation
52	NAPs	Network Access Points
53	NIC	Network Interface Card
54	NSF	National Science Foundation
55	NT	New Technology
56	OCR	Optical Character Reader / Recognition
57	OSI	Open System Interconnection
58	PC	Program Counter
59	PIXEL	Picture Element
60	PSTN	Public Switched Telephone Network
61	POST	Power On Self Test
62	RAM	Random Access Memory
63	RGB	Red Green Blue
64	ROM	Read Only Memory
65	SCSI	Small Computer System Interface
66	SDLC	System Development Life Cycle
67	SMTP	Simple Mail Transfer Protocol
68	SRAM	Static Random Access Memory
69	SVGA	Super Video Graphics Array
70	TCP/IP	Transmission Control Protocol / Internet Protocol
71	UPC	Universal Production Codes
72	URL	Universal Resource Locator
73	VAN	Value Added Network
74	VGA	Video Graphics Array
75	WAN	Wide Area Network
76	WWW	World Wide Web
77	XGA	Extended Graphics Array

IMPORTANT ABBREVIATIONS

COMPUTER SCIENCE (SYLLABUS)
BALOCHISTAN BOARD
(For Class XI)

CHAPTERS	CONTENTS
Chapter 1- Basic concepts of IT	- Hardware Vs Software - Input and Output devices - Operating system and computer programs - Basic units of Data Storage, storage & memory - System Development
Chapter 2- Information Networks	- The Technology of Workgroup Computing - The Benefits of E-mail - What is internet and how it is useful - LAN Vs MAN - Concepts Models, standards, network topologies
Chapter 3- Data Communication	- Introduction of Data Communication - Types of Data - Encoding different types of Data - Transmission media - Modem
Chapter 4- Application and use	- Computer and opportunities offered by their use - Types of System encountered in Every day life, home, Business, Education, Industry. - Understand how computers can simplify our work practices
Chapter 5- Computer Architecture	- Block diagram of computer (CPU, RAM, ROM, Input/Output, Data bus, Address Bus, Control Bus and Ports) - Register, Program Counter (PC), Memory Address Register (MAR), Memory Buffer Register (MBR), Instruction Register (IR), Stack Computer Operations a. Simple Machine Instructions format b. Processing Machine Instructions (fetch-decode-execute) - Understand the Functionality of Different Types of Software
Chapter 6 Security, copyright and the Law	- Viruses and Anti-Virus issues - Data protection and privacy issues - Data protection legislation and copyright issues
USE OF SOFTWARE	

Operating Systems(Windows)	**Operating Systems (Windows)** • Introducing GUI Operating System • OS Components and Selection Techniques • Starting to use GUI operating system • File and Disk Management • Control Printing Jobs
Word Processing	• Starting to use Word Processor • Font, Paragraph, Page Formatting • Introducing Tables and Columns • Using the Clipboard • Printing • Tables, Text Boxes, Graphics and Wordart
Spread Sheet	• Introduction to Spread Sheet Packages Spread Sheet Layout • Formatting and Customizing Data • Formulas, Functions and Named Ranges • Introducing charts • Printing Worksheets and Charts
Internet Browsing and Using E-mail	• Introduction to Browsing • Addresses, Links and Downloading • Searching the Internet • E-mail & Newsgroup

PRACTICALS

Windows

1. Use of Start Menu: Manage Program Group & Document Group, How to access Search Group
2. Customize the Desktop,
2. Use of Windows Help
3. Use of Windows Accessories: Word Pad, Calculator, Paint
4. Managing files and folders using My Computer, Managing files and folders using Windows Explorer, Managing Recycle Bin Operations,
5. Installation of given printer driver, Setting up different properties of printer, Managing the ques of printing jobs

MS Word

1. Open and save files in specified path or New Folder
   Selection of text by different methods and applying different operations, Copying, Moving (by Clipboard and Drag & Drop methods) Deletion
2. Formatting text (Bold, Underline, Font, Colour etc)   3. Use of Undo and Redo
4. Use of Text Alignment, Indenting and managing space. Also use of Bullets and Numbering
5. Use of Page Setup including Page Margin, Size, Paper Source and Layout

6. Skills of Printer Settings   7. Use of Tables and Columns
8. Use of Spell Check Grammar and Thesaurus   9. Use of shortcuts

MS Excel
1. Inserting & Deleting Cells, Rows and Columns   2. Managing Worksheets
3. Formatting and Customizing Data
4.   Use of Formulas and functions (formatting numbers, decimal places, column & rows setup etc)
5. Drawing of different types of charts   6. Use of Page Setup and Printing Configurations
7. Use of shortcuts

Internet Explorer
1. Send/receive email to single user, multiple users   2. Attach/Detach files with mail
3. Browsing Internet   4. Use of Shortcuts   5. Proper use of search engines

WEIGHTAGE FOR VARIOUS CHAPTERS FOR PAPER (BALOCHISTAN BOARD)

Chapters	Weightage %
Basic concept of IT	10%
Information Network	10%
Data Communication	10%
Application and use of Computer	10%
Computer Architecture	25%
Security, copyright and law	10%
Operating System	5%
Word processing	8%
Spread Sheet	7%
Internet browsing and Using E-mail	5%

> "Computers are incredibly fast, accurate and stupid; humans are incredibly slow, inaccurate and brilliant; together they are powerful beyond imagination."
>
> **Albert Einstein.**

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